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WORKING PLAN

OF THE

SUNDERBAN GOVERNMENT FORESTS.

KHULNA AND 24-PARGANAS DISTRICTS, BENGAL.

Prepared under the supervision of the Conservator of Forests, Bengal.

BY

R. L. HEINIG,

INDIAN FOREST SERVICE.

1892.

CONTENTS.

INTRODUCTION.

PART I.

SUMMARY OF FACTS ON WHICH THE PROPOSALS ARE BASED.

	Para.	Page.
Description of the Tract dealt with—		
Name and situation	1	1
Configuration of the ground	2	2
Underlying rock and soil	3	,,
Climate	4	,,
Agricultural customs, and wants of the people	6	3
The Composition and Condition of the Forests—		
Distribution and area	8	4
State of the boundaries	10	,,
Legal position	12	,,
Rights	17	6
Composition and condition of the crop	18	,,
Injuries to which the crop is liable	27	7
System of Management—		
Past and present systems of management	32	8
Special works of improvement undertaken	37	9
Past revenue and expenditure	41	11
Utilization of the Produce—		
Marketable products	42	,,
Lines of export	43	14
Markets	45	15
Mode of extraction and its cost	47	,,
Net value of each class of produce	49	17
Miscellaneous Facts—		
The Forest Staff	50	18
Labour supply	51	19

PART II.

FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED.

Basis of Proposals—		
Working Circles	1	20
Subdivisions of the Working Circles	4	,,
Analysis of the crop	5	,,
Method of Treatment—		
Object sought to be attained	16	21
Method of treatment	18	22
The exploitable age, and the rotation proposed	19	,,
The Fellings—		
Satkhira and Protected Forest Working Circles	23	,,
Bagirhat and Khulna Working Circles	24	23
Arrangement of coupes	25	,,
Supplementary Regulations—		
Sylvicultural operations, &c.	25	,,
Miscellaneous—		
Forecast of outturn	26	24
Forecast of revenue and expenditure	27	,,

APPENDICES.

		Page.
A.	Note on the sale and settlement of Waste Lands in the Sunderbans	i
B.	List of the Trees, Shrubs, and Climbers of the Sunderban Government Forests	iii
C.	Observations on Rates of Growth	ix
D.	Record of results of Valuation Surveys	x
E.	Description of Crop on lines of Survey	xii
F.	Administrative Rules and Executive Orders pertaining to the Sunderban Forest Division.	xiv

MAPS.

1. General Map of the Ganges Delta.
2. Map of the State Forests of the Sunderbans.
3. Map of the Bagirhat Working Circle.
4. Map of the Khulna Working Circle.

No. 521T.R. dated Darjeeling, the 23rd June 1893.

From—H. J. M INTOSH, Esq., C.S., Under-Secretary to the Government of Bengal Revenue Department,

To—The Conservator of Forests, Bengal

WITH reference to the correspondence ending with Government Order No. 513For., dated the 3rd September 1891, I am directed to forward, for your information, the accompanying copy of a letter from the Inspector-General of Forests to the Government of India, No. 42W.P., dated the 11th April 1893, and to say that, under the provisions of section 88 of the Forest Department Code, the Lieutenant-Governor is pleased to approve the Working Plan for the Sundarbans Government Forests, as finally sanctioned by the Inspector-General. The provisions of the plan should be brought into effect from the 1st July 1893.

2. I am to add that the Superintendent of Government Printing, Bengal, will now be asked to finally print off 30 copies of the plan, and to have it bound up with all important correspondence regarding its provisions. Twelve copies of the plan will be forwarded for your own use and for the use of the Divisional Forest Officer concerned, as soon as received from the Superintendent.

No. 215, dated Camp Chakeradhurpur, the 12th February 1891.

From—E. P. DANSEY, Esq., Offg. Conservator of Forests, Bengal.

To—The Secretary to the Government of Bengal, Revenue Department (Forests).

I HAVE the honour to submit, for the orders of His Honour the Lieutenant-Governor, a report on the Sundarbans forests prepared by myself on the occasion of a recent inspection of those forests.

2. This report describes the working of the Sundarbans forests since the period of their inclusion under the management of this department; it endeavours to explain the fall in the revenues during the past ten months, and it contains proposals for the future working of the reserved area on the basis of a working plan, in respect to which it will be necessary to obtain the professional opinion of the Inspector-General of Forests to the Government of India.

3. The report also contains suggestions for effecting certain changes in the existing scale of royalties, and in the system of measurements under which such royalties are at present collected on timber. These last proposals have been drawn up by me in consultation with Mr. Ellis, the Divisional Officer, and in view of the great importance of the subject, early orders are solicited in reference to this part of the report (paragraph 15).

Outline of a working plan for the Sundarbans Reserved Forests, with a report on the present system of working.

THE reserved forests of the Sundarbans Division are divided into three blocks—

The Baghirhát block	..	...	...	500	square miles.
The Khulna	„	...	...	699	ditto.
The Satkhira	„	...	...	382	ditto.
			Total	1,581	ditto.

The former two blocks were notified as reserved forests partly in 1875 and partly in 1876, and the last-named in 1876. The original object appears to have been to merely reserve the more valuable sundri tracts, and for this purpose the Baghirhát block and the upper half of the Khulna block were selected. This area was subsequently increased as above, more with a view to secure a well-defined natural boundary for the reserve as a whole, and to facilitate control, than for any special value which might attach to the forests of the Satkhira and South Khulna regions. In this connection the Local Government writes (Resolution on the Annual Progress Report of Forest Administration in Bengal for 1874-75):—

"The object of Government in forming the reserve "has not been so much the realization of profit as the preservation, for the public benefit, of a valuable property which was being

recklessly destroyed, and which ministered to needs which could not well be supplied from any other quarter."

Consequently upon the Conservator (Dr. Schlich) recommending that the whole of the unleased area of the Sundarbans should be placed under the Forest Department, the Local Government referred in these terms to the proposal (Resolution on the Annual Progress Report of Forest Administration in Bengal for 1875-76)—

"But the Lieutenant-Governor is of opinion that the public convenience requires that the reserved tract should be limited to the smallest area compatible with the effectual preservation of the valuable sundri timber, and he would be unwilling to enforce any restrictions which are not shown to be necessary to the accomplishment of this object. It is therefore probable that no further additions will be made to the reserved area in the Sundarbans."

2. The principle underlying these Resolutions of the Government of Bengal is that which has been adhered to in the subsequent management of the Sundarbans reserved Forests.

Indeed, the intention at first seems to have been to impose no restriction whatever on the export of forest produce from the reserved area, it having been assumed, as a result of an inspection of these forests made by Mr. Home in 1873, that they were inexhaustible. In this connection, Dr. Schlich wrote (paragraph 19 of his Annual Progress Report for the year 1873-74)—

"Allowing even that the surveys made give results above the average, the forest must be called extremely rich, in fact inexhaustible for all practical purposes, considering the large extent of the area."

In the following year, however, Dr. Schlich made a careful examination of the Sundarbans forests himself, and seems to have found it necessary to alter his previously expressed opinion on the subject, for we find him writing (paragraph 40 of his Annual Progress Report for the year 1874-75)—

"The Sunderbuns yield, year after year, immense quantities of forest material for all adjoining districts especially the 24-Parganas, Jessore, and Backergunge. Endless numbers of boats proceed in the dry weather to the forests, and return laden with timber, especially sundar, rafters, firewood, thatching-grass, &c., to supply which there is no other source available, and consequently it is our duty to see that the supply is not exhausted. Moreover, the demand is certain to increase, and we must therefore make sure that the increase is also provided for. It has been said that the supply is inexhaustible, but such is not the case. It appears, on the contrary, that the western part of the Sundarbans, which is that nearest to Calcutta, is already exhausted to a very large extent, and that fuel-cutters proceed more to the east year after year. Even in the sunder tracts one sees, for long distances from the river banks, nothing but dead sunder trees and seedlings. No doubt the centre parts of the island still contain large quantities of full-sized trees; but then it should be remembered that nearly all islands consist of marshy ground, and that all material has to be carried or dragged, by men to the banks of the rivers and nalas, so that, practically, a great portion of the available stock must be considered as beyond reach. Moreover, owing to the absence of accessible and superior fuel in the western half of the islands, fuel-cutters resort more and more to the sunder tracts in the east, and here they cut, not dry trees, or the branches of the trees felled for timber, but saplings of sunder of good growth, which are easier to cut than dry wood, and which pack closely in the boats. Indeed, herein lies the great danger of the supply of sunder timber for boat-building being exhausted. If the straightest and best sunder saplings are cut for fuel year after year, and in the accessible parts of the forests, it is but natural that the supply of full-grown timber must fall short. This explains why the boat-builders in the Backergunge district, where boat-building is chiefly carried on, have complained for some years past that they cannot obtain now the same class of sunder timber which they used to get in former years, a point to which Sir Richard Temple drew attention in a note on the Sundarbans, dated September 1874."

3. In consequence of these considerations, the working of the Sundarbans reserve, comprising the three blocks already referred to, was in 1876 systematised on the basis of a rational, although, at the same time, extremely simple plan, directed to the conservation of the soondree on what was then considered to be a sufficiently large area, namely, the Baghirhat block, to the east of the Pussur river. This plan, which has undergone no important modifications in subsequent years, provides—

1.—That in the Baghirhat block no soondree trees shall be felled, other than dry trees of less than 3 feet 9 inches in girth at 4½ feet from the ground.

2.—That there shall be no restrictions of any other kind on the working of the reserved area for either timber or firewood or other forest produce.

The rates themselves were fixed as follows:—

Soondree timber	...	... 1 anna per maund.	(The weight of one cubic foot of soondree is about 80 lbs.; when wet say one maund.)
All other „	...	... 3 pies „	
Firewood	...	... 3 „ „	
Wax and honey	...	... 1 anna per head load.	
All other minor produce		... 3 pies per maund.	

Later on, the second of the two provisions mentioned above was modified to the very necessary extent of defining as timber, in contradistinction to firewood, and taxable as such,

all soondree, pussur, amoor and goran pieces of 8 feet in length and upwards, and 3 feet 9 inches and upwards in girth at the thick end of the piece. At the present day, after an interval of 15 years, the rates for forest produce exported from the Sundarbans reserve are on the following very liberal scale—

Soondree, pussur and amoor timber ...	... One anna per maund (or say per cubic foot)
Goran timber	... Half ditto ditto.
Soondree firewood ...	... Half ditto ditto.
Wax and honey	... Re. 1-8 per man per mensem (right of collection).
Any other forest produce ...	... Quarter anna per maund.

4. After reading all that Dr. Schlich has said relative to the possible exhaustion of the timber trade in the Sundarbans, it seems strange that he should have contented himself with the establishment of safeguards, in regard to the soondree tree, which, however well calculated to perpetuate the species, could obviously have no permanent effect in distributing the available resources of the forest in ripe timber over the period of time necessary for a sufficiency of the younger soondree trees to themselves reach the dimensions of maturity.

In respect to a considerable tract of country—the Baghirhat block, or forest east of the Pussur river—Dr. Schlich caused the felling of soondree trees under a certain size to be prohibited by law, but above those dimensions, the people could continue to cut what they pleased, and as much as they pleased, with the risk of the timber trade in the Sundarbans bye-and-bye suffering for want of suitable material, and this with all the greater probability that, outside this specially reserved area, no cultural restrictions whatever were to be imposed, and indeed the only attempt to prevent the reckless cutting up for firewood of the straightest and finest soondree sapling and poles west of the Pussur river took the form of an enhanced rate of 6 pies per maund for soondree firewood as compared with 3 pies per maund for other kinds of fuel. It seems evident from the foregoing that Dr. Schlich himself looked upon the Sundarbans reserved area as an inexhaustible source of timber supply, provided some restraint was imposed on the hitherto indiscriminate cutting up of soondree for firewood, and that there should be a limit to the dimensions at which the soondree trees might (in the case of a third of the total area of the reserve) be felled for timber.

Moreover, this limitation of the dimensions at which soondree trees might be felled for timber does not appear to have been at all (of late years at least) strictly observed in practice.

Having remarked in the course of my tour that undersized soondree logs were being exported from the Bagerhát block, I instituted enquiries, with the result that 88* per cent. of the soondree trees cut in that tract during 1889-90 were found to be undersized, and 73* per cent. of those felled in the current year. Practically speaking, the intentions of Dr. Schlich in respect to a more rational working of the Sundarbans forests have therefore (of late years anyhow) only been carried out in so far that soondree could not be cut for firewood in the Bagerhát block.

* These figures were calculated from the outturn of two months in the case of two principal revenue stations.

Mr. Ellis explained to me that the course hitherto pursued by him in regard to these undersized logs has been to charge the same price for them as for logs possessing the larger dimensions of 4 feet in girth, which is equivalent to saying that the man who transgressed the law to the extent of cutting undersized trees in the specially reserved area was always permitted to compound his offence, however often persisted in, by paying a fine of a few annas† in each case, with the right to then take possession of the timber.

† The royalty in force being only one anna per cubic foot.

The limitation in respect of dimensions of which soondree trees might be felled for timber was thus, as in the case of soondree firewood, silently permitted to resolve itself into a mere question of expediency on the part of the purchaser in respect to the removal of produce which was assumed to be taxed above its market value. I have no objection to offer to the principle underlying this method of prevention: in fact, I consider it to be the best that could be adopted in the peculiar conditions of the Sundarbans forests, where it is almost impossible to exercise a proper control over the actual felling of the trees; and it would be certainly unfair on the purchaser to assume, from the mere circumstance of his logs being undersized, that the trees from which they were derived were themselves in all cases below the sanctioned limits of girth. My objection is that the felling of undersized trees was permitted to become a *profitable* undertaking, as is indeed manifest from the figures recorded above. There does not appear to have been, in fact, any serious attempt to check the abuse, and it would, indeed, seem as if Mr. Ellis had not even appreciated the importance of doing so; that officer regarding the matter more from a revenue than from an economical point of view.

5. That it should not have been considered necessary to regulate the extraction of soondree trees on a basis which could ensure an uninterrupted supply of ripe timber of that species seems to me all the more surprising that, while I think the end in view could have been attained without difficulty, and without seriously inconveniencing the public, it was to be expected that any restrictions imposed on the felling of undersized trees over the eastern half of the reserve (the Bagerhat block) would have the effect of concentrating the operations of the wood-cutters on those mature trees which Dr. Schlich himself announced to be insufficiently numerous in the accessible localities.

6. My present visit to the Sundarbans was induced by a number of considerations. In the first place I had never been there before, and it was incumbent on me to understand

all about the working of my most important division. And in the second place, the revenues of the Sundarbans, after having shown in previous years a progressive and steady increase—

		Rs.
1885-86		
1886-87	Revenue	3,47,447
1887-88	„	3,76,045
1888-89	„	3,97,301
1889-90	„	4,36,276
	„	4,85,458

had since the commencement of the current official year, displayed a no less remarkable tendency to decline:—

Months.	Revenue for	
	1889-90.	1890-91.
	Rs.	Rs.
April	38,637	34,296
May	24,386	23,676
June	24,923	18,088
July	30,552	21,029
August	36,937	26,256
September	43,708	33,105
October	61,760	46,354
November	62,701	53,051
December	44,402	42,204

My first step was to strengthen the Sundarbans staff with a second Sub-Assistant Conservator, and my next to examine the working of the division on the spot.

7. Accompanied by Mr. Ellis, the Deputy Conservator in charge of the Sundarbans Division, I left Calcutta by rail for Khulna, on the night of the 12th January, embarking on the S.S. *Seal* at the last-named place early the following morning. During the subsequent fortnight, I visited both the reserved and the protected area, journeyed as far east as the timber marks of Jalokatti and Barsakatti in Backergunge, and returned to Calcutta *vid* Canning on the 26th January. Besides inspecting the forests and examining into the system of working, I had opportunities for discussing this last subject, as also the decline in the outturn of timber, with the exporters themselves.

I have no fault to find with the system of collecting the revenue, which seems to me the best possible in the circumstances of the case. Forest stations for the issuing and checking of permits to cut, collect, and remove forest produce have been established at all the principal points of ingress into the Sundarbans, and it is difficult for purchasers to take away material without passing two or more of these stations on their way out. In other words, illicit traffic in forest produce is hardly possible without connivance of some sort on the part of the executive forest staff, whose duty it is to levy royalty at these stations and to patrol the water-channels generally. On the other hand, such connivance can only be guarded against by systematic vigilance on the part of the Divisional Officer and his gazetted assistants, who have, for this purpose, been provided with steamers and other fast-running craft, in which they are supposed to constantly cruise about the Sundarbans waters, intercepting boats and comparing the quantity and character of the material under export with the covering passes issued therefor at the forest stations.

9. I am not satisfied that this supervision on the part of the controlling staff has been in the past all that it ought to be. The Divisional Officer has not had sufficient assistance given to him, and has, perhaps, himself been in the habit of spending too much of his time at head-quarters, although not more so on the average than has been authorized in his case under an old order of Government (Revenue Department, Forests, No. 2160, dated 10th September 1878) which left this matter to be settled by Dr. Schlich, who fixed the maximum number of days to be passed at head-quarters in any one month at 15—a limit which seems to me too high.

10. At the same time, I am not disposed to attribute the present fall in the revenue to any extraordinary relaxation of control during the past 10 months, nor yet to any defects in the system of control itself.

There has been, I think, a large decrease in the outturn of timber from the Sundarbans forests during the current year, and this decrease appears to me to be connected to some extent with the excessive damage done to the paddy crops in the surrounding districts by the inundations of last monsoons, with the consequent impoverishment of the people, and the appropriation of money for purposes more vitally important than the repair of boats and the construction of new river craft.

The firewood is consumed in Calcutta and the larger towns and its supply remains unaffected by considerations of the above nature. The timber, on the other hand, furnishes the whole country round (the 24-Parganas, Jessore, and Backergunge) with material for boat-building, a means of conveyance which hardly a village can do without in the water-locked deltas of the Ganges and Brahmaputra, and for which they seem to be entirely dependant on the resources of the Sundarbans reserved forests.

It seems also certain, from the enquiries made by me, that serious difficulties are being encountered in obtaining suitable soondree timber from accessible localities. It will be observed (see paragraph 2) that this difficulty existed in Dr. Schlich's time, and as that officer's working-plan was not calculated—even if it had been strictly acted up to, which it has not—to regulate the felling of the mature soondree timber within the natural resources of the forest, it is not difficult to understand that a situation which was bad 15 years ago has grown worse in the interval, under the stimulus of a demand which a constant royalty of one anna per cubic foot on soondree timber has doubtless of late years tended to expand beyond the absolute requirements of the market.

11. It seems to me immaterial to discuss here whether the outturn of timber from the Sundarbans forests will or will not regain its former level under improved conditions of demand. If we continue to impose no real restrictions on the felling of soondree trees, I think it possible that the outturn may be as high as ever for some few years to come, subject, of course, to there being no disturbing causes, such as that which is believed to have affected the operations of the current year. On the other hand, I feel quite confident that, without the introduction of some such system as that which I am about to propose in the following paragraphs, the entire extinction of the Sundarbans timber trade, and much consequent distress to the surrounding boating populations, must occur sooner or later.

Mr. Ellis has estimated the contents of the average soondree logs exported from the Sundarbans to be 13½ cubic feet. Basing my calculations on this factor, the returns of three years only (1886-1889) show that the number of soondree trees felled for timber alone, in the Sundarbans reserved forests, has aggregated in that short interval 1,063,000. The total area of the reserves is put down at 1,581 square miles. But much of this must represent water-courses and tracts in which there is little or no soondree timber to be found; the whole of the Satkhira block, for instance. Let us say that the soondree timber-producing area aggregates 1,000 square miles. The above figures imply that, on the average, one soondree tree is extracted for timber purposes each year out of every two acres of the soondree-producing area of the reserves. By itself this may not appear excessive in respect to a class of forest so densely stocked as are the Sundarbans. We must, however, here take note of two things. In the first place, the people have been confining their fellings to the narrow fringe of accessible forest (say 300 yards deep on the average) bordering the numerous islands of which the entire Sundarbans are constituted. And, in the second place, no account has here been taken of the immense quantity of soondree cut up for firewood to the west of the Pussur river. It is also a known fact that by far the larger quantity of the timber exported has been hitherto cut in the Baghirhât block, the total area of which is only 500 square miles (inclusive of water-channels and tracts in which there is no soondree susceptible of developing into useful timber).

Thus, whether or not the capability of these reserved forests has been exceeded as a whole, it seems certain—and the large proportion of undersized logs exported in late years tends to confirm the conclusion—that all the readily accessible parts of the forest have been grievously overworked as regards mature timber, and that the exporters have now, in most cases, to content themselves with soondree trees of from 3 to 3½ feet in girth, whereas the tree attains maturity at from 4½ to 5 feet in girth.

One of the evils attendant on this concentration of the felling in narrow circular bands over the entire area of the Sundarbans reserves has possibly escaped notice, although it is sufficiently important to merit our attention. The characteristic features of the Sundarbans forests are, first, the dead level of the ground, and, in the next place, the extraordinary density of the stock which numbers, on the average, not less than 4,000 stems to the acre. Not only is the tree growth so closely packed as the above, but the entire surface of the ground is covered, at intervals of a few inches only, with what appear at first sight to be inverted tent-pegs placed there for the express purpose of defending these forests from the foot of intruding man. These bare, pointed, and upright spokes, six inches to a foot in length, are spurious shoots thrown out in all directions from a root-system representing 4,000 stems to the acre, and seem to be characteristic of this tidal vegetation, as it is not only the soondree tree which sends them forth, but other species as well. The united effect of these two causes, the low uniform level of the ground, and the impenetrable nature of the forest, when combined with the system of working described above, is that the wood-cutters themselves no longer know where to find their timber, without explorations that are not only laborious in themselves, but even perilous by reason of the number of man-eating tigers about. They lose both time and money in making fruitless searches for timber in localities that have been already exhausted by them, although there is nothing to indicate to the eye that they have been so exhausted. In many cases they are altogether unsuccessful, and return to their homes, or to the timber mart, with small or inferior material. One or two timber merchants interrogated by me went so far as to attribute to this cause alone the decline in the outturn of soondree timber during the current year. Whether the evil has grown to these dimensions or not, its baneful effects are acknowledged on every side, and no stronger arguments can be adduced against the continuance of the existing want of system in the working of the Sundarbans reserves.

and in support of the very simple working-plan that I am now about to suggest for the acceptance of the Local Government.

12. The working-plan which has suggested itself to me is the following:—

(*a*) That the Sundarbans reserved forests should be divided into three working circles, to correspond with the three present administrative divisions of the area, namely—

	Area.
The Bagerhat circle	500 square miles.
The Khulna „	699 ditto.
The Satkhira „	382 ditto.

(*b*) That in the Satkhira circle (which seems to be so situated in regard to tidal action and other physical conditions as to be not susceptible of producing useful timber trees, even if there was not quite enough ground for the purpose without it) there should be no interference with the existing practice, except in so far as this may be affected by the revised scale of royalties proposed in paragraph 15 of this report.

(*c*) That the two circles of Bagerhat and Khulna, the only good soondree-producing tracts in the reserve—and they seem to be equally rich in this respect, with this difference, that the Khulna block has been least worked over—should be dealt with on the following principles:—

(1) The actual timber-producing area in each circle to be roughly ascertained, and to be then divided by the number of years (approximate) in which a soondree tree of 2 feet in girth will reach a girth of 5 feet.

(2) This quotient, which will probably aggregate for both circles not less than 35 square miles, to represent the area over which the felling of unmarked soondree, pussur, amoor, and keora trees may alone be permitted in any one year, the entire area of each circle being passed over by progressive annual coupes of this size, extending from due north to due south; or, in other words, from the limits of cultivation to the sea-border, and embracing a period of time equal to that required by a soondree tree of 2 feet in girth to reach a girth of 5 feet, say 30 years.

(3) The entire area of each circle to be divided into a number of blocks corresponding to the number of annual coupes; in other words, corresponding to the length of the rotation, or to the number of years required by a soondree tree of 2 feet in girth to reach a girth of 5 feet; and each such block to be an island in itself, or an aggregate of islands, and to be (as much as geographical features will admit) of equal area with the rest of the blocks.

(4) The felling of unmarked soondree, pussur, amoor, or keora trees to be only permitted inside the block appointed for the year's working; and this permission to thin only extend to trees exceeding 3 feet in girth, any and all of which may be felled for timber, but not for firewood; provided that the department may itself mark trees of any size and of any kind for purposes of either timber or firewood, being guided in this respect by the cultural exigencies of the forest.

(5) No soondree, pussur, amoor, or keora trees whatever to be felled for firewood in any part of the circle unless specially marked for the purpose by the Department, but all other kinds of wood to be felled and removed by the public at discretion, either for firewood or timber, both inside and outside the block appointed for the year's working.

(6) The block appointed for the timber operations of the year to be opened out by straight cut lines 8 feet in width, arranged in such a way as to tap the centres of each island. These lines should not cost more than Rs. 40 per mile, and the total annual expenditure on this account will, it is believed, not exceed Rs. 2,000. These lines not to be maintained in repair beyond the time required to work out the timber in each case.

(7) The soondree and other species occupying these tidal forests do not coppice well. In most instances the stumps at once rot, and this circumstance is supposed to be due to the action of salt water on the exposed surface of the wood. The restocking of these forests is consequently almost entirely effected by seed, which is conveyed from place to place by the action of water on occasions of spring-tides, when the entire surface of the Sundarbans reserve is believed to be in some degree submerged, the wild animals of the forest then taking refuge for the time being on fallen timber, on the stumps of trees, or wading about in the shallow water itself.

So long as the people are not permitted to cut up indiscriminately the soondree, pussur, amoor, and keora trees found in these two working circles for firewood, there will always remain a sufficiency of trees of those species for the requirements of reproduction by seed, apart from which fact the existing stock of soondree trees of and under 2 feet in girth is all that could be desired at least to the east of the Pussur river.

I do not propose increasing to more than 3 feet the lower girth limit at which soondree trees may, during the course of the first rotation, be felled for timber, and this because large soondree trees are no longer plentiful, and the physical obstacles to export are too serious to admit of very isolated operations. On the other hand, with every year of the advancing rotation, the proportion of large trees will increase. At the end of the first rotation, say 30 years, $\frac{1}{30}$ of the soondree-producing area (and that nearest the market) should be full of mature soondree trees; and from that time onwards there need be no fear of interruption to the regular supply of well-grown timber of both soondree and the other timber-yielding

species, which should be found concentrated, from year to year, on $\frac{1}{10}$th of the area of the reserves, instead of being, as now, scattered in unknown places over twelve hundred square miles of country. The economy and convenience of this arrangement are, I venture to think, manifest.

It will be objected to that the working circles proposed by me are too large. There is, however, nothing to be gained here by multiplying the number of circles. The demand must all come from the north; communications are everywhere good; the whole area is subdivided into numerous islands; and our own control is simplified by concentrating the work as much as possible.

13. A working-plan on these simple lines could, it is believed, be drawn up in a couple of months; and pending the changes which its introduction would effect in the whole system of working the Sundarbans reserve. I would not recommend interference with abuses (such as the removal, on payment of a higher scale of rates, of undersized soondree trees from the Bagerhat block) that have been so long acquiesced in as to be regarded by the people in the light of privileges.

14. On the other hand, it will be obviously desirable to enhance the existing rates for all kinds of forest produce exported from the Sundarbans, if only to ward off that fall in revenue which the practical absence of system in the past, and the consequent depletion of the forests as regards timber, threatens us with. We are building a third steamer; we propose to facilitate working by means of export lines; and the demand and prices for forest produce are not what they were 15 years ago; added to which our controlling establishment has been organized on a more expensive footing.

15. The rates for, and classification of, forest produce proposed by me are—

1. Pieces of wood measuring 8 feet and upwards in length, or of which the girth at the thick end of the piece is 3 feet or more, shall be classed as logs, and charged for as follows, according to the kind of material:—

Soondree logs ...	...	1¼ annas per running foot.
Pussur and amoor logs	...	1 anna „ „
Logs of any other species	..	½ „ „ „

2. Pieces of wood measuring 8 feet and upwards in length, and of which the girth at the thick end of the piece is under 3 feet, shall be classed as poles, and charged for as follows, according to the kind of material:—

Soondree posts	...	1 anna per maund	boat measurement.
Pussur, amoor and goran posts ..	...	9 pies „ „	
Other kinds of posts	...	6 „ „ „	

3. Pieces of wood measuring less than 8 feet in length, and of which the girth at the thick end of the piece is under 3 feet, shall be classed as firewood and charged for as follows, according to the kind of material:—

Soondree firewood	...	9 pies per maund	boat measurement.
Goran „	...	6 „ „ „	
Other kinds of „	...	3 „ „ „	

4. Wax and honey ... ... Re. 1 per maund.
5. All other forest produce ... 3 pies „ „ (boat measurement).

16. These proposals practically involve an increase of 25 per cent. in the rate that we have seen the public willing, in fact too eager, to pay for undersized logs from the Bagirhat block; and we may conclude from this that the revised tariff is not excessive in regard to the market demand and the requirements of the case.

It will be seen that, instead of adopting the old method of charging at so much the cubic foot—an altogether unintelligible factor to the purchaser, and for this reason alone to be avoided—I have arranged for a rate on the basis of the running foot. This method enables the most ignorant boatman to verify the royalty charged him by the Forest Babu. I consider this a most important advantage, as being calculated to give confidence to the exporter, who is placed in the position of being able to know before hand the amount of royalty that he can justifiably be called upon to pay. Under the existing system, all this is out of the question, and there is not a purchaser who does not think himself robbed at our revenue stations.

It is evident that under the system of measurements proposed by me for logs, exporters of soondree and other reserved species from the two working-circles suggested by me will find it more in their interest to fell large trees than small trees, other conditions being equal.

It should also be mentioned that this running foot method of measurement is a very convenient one under the peculiar conditions of export prevailing in the Sundarbans, where the soondree logs are all floated out, and are in this state often found submerged to a depth of a couple of feet or even more, rendering the work of measuring girths an arduous and uncertain operation. Other kinds of logs are mostly cut into short lengths (keora, for instance, which is largely used for making packing-cases) and carried inside the boats. It is the same with all kinds of poles.

I have proposed to increase the rate of soondree firewood from six pies to nine pies per maund, having in view that the present rate would appear to have no deterrent effect on the wholesale cutting up for firewood of this species in preference to any other species. The greater straightness of the young soondree saplings is a great attraction to the fuel-cutters, who are able to stow away in their boats a larger quantity of soondree firewood than of any other class of fuel. Thus the outturn of the former was in 1888-89, 3,971,016 cubic feet, against 5,902,960 cubic feet of all the other woods combined. The figures for 1889-90 make no distinction of the kinds of wood. It is evidently undesirable that the efforts of the fuel collectors should be thus concentrated on one species. For the same reason I have ventured to recommend a special rate for goran firewood, as this species is in very considerable request for house posts. In 1888-89 the export of goran posts aggregated 1,271,704 cubic feet; or $\frac{1}{4}$th of the total export of timber from the Sundarbans forests.

17. I shall conclude this report with one last suggestion, namely, that a steam-cutter capable of running up all the shallower channels of the Sundarbans (which are now impassable to our steamers) should be provided for each of the three latter. The cost of such a steam-cutter will, it is believed, be about Rs. 4,000.

CAMP CHAKRADHURPUR,
The 12th February 1891.

E. P. DANSEY,
Offg. Conservator of Forests, Bengal.

No. 513For., dated Calcutta, the 3rd September 1891.

From—C. E. BUCKLAND, Esq., Offg. Secy. to the Govt. of Bengal, Revenue Dept.,
To—The Conservator of Forests, Bengal.

WITH reference to your letter No. 215, dated 12th February 1891, submitting proposals (*a*) for the future working of the reserved forests in the Sundarbans on the basis of a working plan, and (*b*) for effecting certain changes in the existing scale of royalties and in the system of measurements under which such royalties are at present collected on timber exported from those forests, I am directed to say that, on the whole, the Lieutenant-Governor sees no objection to the altered mode of calculation, or to the increased rates of royalty, proposed by you, and that the general idea of the working plan sketched out by you is, in His Honour's opinion, certainly sound.

2. I am to request that you will, with reference to section 69 of the Forest Department Code, obtain the Inspector-General's opinion on the provisions of the plan, and that you will submit, for the sanction of the Government of India, a draft notification amending Rule I of the rules prescribed under sections 31 and 41 of the Indian Forest Act for the Sundarbans Protected Forests.

E. D'S.—Reg. No. 4717J—128—20-7-92.

INTRODUCTION.

THE proposals on which this working plan is based were made by the Conservator of Forests, Bengal, in his No. 215, dated the 12th February 1891, to the Government of Bengal. They were sanctioned by His Honour the Lieutenant-Governor of Bengal in letter No. 513For., dated the 3rd September following, and approved by the Inspector-General of Forests in his No. 822, dated the 14th October 1891.

The period devoted to the cutting and collection of tree-stump sections and to valuation surveys, including the time occupied in going to and returning from the forests, was 35 days, namely, 28 days in December 1891 and January to March 1892, and 7 days in July 1892.

The direct charges incurred were—

	Rs.	A.	P.
Hire of bolio	15	2	0
Price of tools	11	12	0
Wages of wood-cutters	354	15	9
Preparation of wood-sections	42	1	0
Total ...	423	14	9

The indirect charges incurred were—

	Rs.	A.	P.
Pay and allowances of crew of steamer *Seal*	371	14	2
Ditto ditto ditto *Swan*	91	10	8
Ditto ditto of the Barge	49	5	11
Cost of 885 maunds of coal consumed	442	8	0
Pay of the Divisional Forest Officer	629	8	6
Ditto Tour Forester	22	14	4
Ditto Peon	8	0	1
Local allowance of the Tour Forester	11	7	2
Travelling allowance of the Divisional Forest Officer	80	0	0
Ditto ditto Peon	2	14	8
Total ...	1,710	3	6

The grand total of direct and indirect charges amounted to Rs. 2,134-2-3.

PART I.

SUMMARY OF FACTS ON WHICH THE PROPOSALS ARE BASED.

Description of the Tract dealt with.

Name and situation.

1. The delta of the Ganges, as shown in the general map submitted with this report, lies within the Murshidabad, Nadia, 24-Parganas, Jessore, Khulna, Faridpur, and Backergunge districts of the Bengal Presidency. The tract of land known as the "Sunderbans" is the southern portion of this delta, extending for about 180 miles from east to west, and 50 to 80 miles from north to south. It traverses

the districts of the 24-Parganas, Khulna and Backergunge, and is bounded on the *north* by zamindari lands, on the *east* by the Meghna river, on the *south* by the Bay of Bengal, and on the *west* by the Hooghly river. The Government forests occupy the western portion of the Sunderbans from the Haringhata river to the Hooghly in the districts of the 24-Parganas and Khulna. They comprise the Sunderban Forest Division, for which this working plan is framed.

Configuration of the ground.

2. The whole of the delta is a flat alluvial plain. Rennel's map of the surveys made in 1764-1772 shows that the part between the Raimangal and Baliswar rivers, now occupied by the Government Reserved Forest, was at that time a swamp, and this tract is now somewhat lower than those to the east and west.

The Sunderban Government Forests cover numerous islands formed by the large rivers of the delta and their connecting channels. The surface of these islands is seldom raised more than two or three feet above high water, and the greater part of the area is liable to inundation during high spring tides.

Underlying rock and soil.

3. The soil is an alluvium of tenacious clay, or loam with a proportion of fine sand, blackened by humus and covered by a thin coating of river mud. Moistened daily at high tide by the overflow or percolation of river water, it forms an excellent bed for the germination of seed, and for the rapid growth of young seedlings.

The sub-soil is a loam consisting of varying proportions of sand and clay, and is shown by borings to extend in places to a depth of 120 feet, where it rests on a stratum of liquid mud 40 feet deep, which, again, overlies strata of clay, sand, &c. An artesian boring recently made at Port Canning has struck sweet water at a depth of 320 feet. The sub-soil contains strata of pure sand, stiff blue clay, beds of peat, and remains of former sundri forest. Roots and stems of sundri trees in fair preservation have been found at Khulna 18 feet, at Mutlah 10 feet, and at Calcutta 30 feet below the ground, underlying strata containing no traces of former land surface. This would seem to indicate that since the last, and comparatively recent, subsidence, a large part of the Sunderbans remained for many years under water. The gradual rise of the islands by accretions of alluvium, especially during high tides in the rains, and their gradual subsidence, owing to the instability of the foundation, are the natural consequences of deltaic action. Where, however, a former land surface has existed bearing vegetation, we find indications of the same in thin layers of peat alternating with the layers of sand and clay.

The soil of the islands is constantly exposed to the eroding action of rivers. The roots of the forest trees do not penetrate the ground to any considerable depth, but extend laterally in every direction a few feet below the surface in the moist upper stratum. The roots of sundri, pussur, amur, baen, keora, and ora throw up innumerable blind root-suckers, six inches to two feet high; the boles of koilsha and sundri sometimes buttress freely, even at an early age; and the rhizophors produce adventitious roots that become auxiliary stems. These natural developments have the effect of arresting denudation and of fixing the soil. The root-suckers referred to above may also serve the purpose of conveying atmospheric air to the roots of certain species.

The distribution of species is mainly affected by the level of the surface of the islands with reference to high-water mark. On newly formed banks or islands the rhizophors establish themselves, soil accumulates, and grass grows luxuriantly; on somewhat higher ground gengwa, baen, pussur, amur, keora, ora, koilsha, &c., grow; and in the interior, where the land is somewhat lower than in the neighbourhood of river banks and subject to inundation only during high spring tides in the rains, sundri, shingar, &c. The light seed of the sundri, shed in the rains, is floated well into the interior of the islands, whereas the large seed of the golpatta is arrested at their verge. A natural broad cast sowing by the agency of the tidal rivers ensures an abundant reproduction of all species. The surface of the soil is very swampy everywhere during the rains, but in the dry weather, and on all the higher levels, it becomes hard, cakes and cracks, and is often covered by a saline efflorescence.

Climate.

4. The following table, showing the *Temperature* and *Rainfall* of the three recording stations of Calcutta, Jessore, and Barisal for the last seven years, has been prepared from figures supplied by the Meteorological Reporter to the Government of Bengal:—

Temperature, 1885-86 *to* 1891-92.

Month.	Calcutta.		Jessore.		Barisal.	
	Mean maximum.	Mean minimum.	Mean maximum.	Mean minimum.	Mean maximum.	Mean minimum.
April	95·2	75·3	97·7	76·7	91·5	75·2
May	94·4	77·6	95·2	77·2	90·8	76·9
June	92·1	79·0	92·4	79·3	89·3	78·3
July	87·9	78·2	89·2	79·1	86·6	77·7
August	86·9	77·2	88·3	78·7	86·0	77·9
September	87·6	77·7	88·8	78·6	88·3	77·9
October	86·4	74·0	86·6	75·0	87·3	74·8
November	81·2	65·2	83·4	65·5	82·2	66·4
December	76·5	56·7	77·9	56·2	77·2	56·9
January	77·0	55·6	77·7	54·0	76·7	55·2
February	81·8	59·1	82·7	56·7	80·6	57·2
March	90·3	69·6	91·7	68·6	88·7	69·7

Rainfall.

Years.	Calcutta.		Jessore.		Barisal.	
	Inches.	Days of rain.	Inches.	Days of rain.	Inches.	Days of rain.
1885-86	66·90	128	75·74	117	91·74	140
1886-87	66·31	125	75·76	108	72·76	132
1887-88	53·22	117	60·65	98	71·27	115
1888-89	68·36	105	64·85	112	74·04	110
1889-90	55·03	125	56·95	127	75·80	113
1890-91	65·03	129	75·21	129	79·31	115
1891-92	41·70	112	51·34	82	58·23	89
Average ...	60·22	120	65·78	110	74·73	117

The normal rainfall during the full period of the monsoon, *i.e.*, from 1st May to 15th November, is—

	Inches.
24-Parganas district	54·28
Khulna ,, ...	55·93
Backergunge ,, ...	79·25

5. North and north-easterly winds blow from October up to middle of March, when south-easterly, south, and south-westerly winds set in. In January and February there are frequent calms; but in April, May, October, and November there are often severe storms that render boat traffic dangerous and prove destructive to the forests. The effect of the strong south-west winds of the monsoon on the more exposed forests of the sea borde is to reduce the general height of the forest crop by breaking the tops of the taller trees, and forcing them to spread and grow stag-headed. The destructive effect of these winds is not so marked wherever an embankment of sand has been formed, as along the sea face of the Backergunge Sunderbans and for eight miles west of the mouth of the Chandesar river. This embankment is first fixed by *Ipomœa biloba* and other trailing plants, and soon capped by spreading *Pongamia* trees that form an excellent protective barrier.

Agricultural customs, and wants of the people.

6. The chief staple of the cultivated portion of the Sunderbans is *rice*. There are two crops, "áus" and "áman," the latter including the "háimanta" or late spring crop. The sowings for the "áus" crop are made on high ground in April and May in well-ploughed fields. When the shoots are six inches high, the fields are harrowed. The harvest is in August and September.

The sowings for the "áman" crop are made on low land after rain in May. The young shoots are pricked out in June, and transplanted in well-ploughed fields. If the season be exceptionally dry, the sowings in the

nurseries do not take place; but the seeds are soaked for 24 hours in water in June, and then sown in the larger fields, whence they are not transplanted. The harvest is in December and January.

The "áus" crop is generally kept for home consumption; the "áman," or a large portion of it, is exported to Calcutta.

7. *Jute* is cultivated in many parts of the Delta, and taken to Calcutta in large sundri boats during the cold weather.

The other staples are sugar-cane, dal, peas, beans, lentils, begun, colocasia, pumpkins, cucumbers, til, mustard, linseed, &c. As communications are almost entirely by water, boats (usually built of sundri throughout) are required for taking this produce to market and bringing back stores for domestic requirements. Boats are also required for ferries and passenger traffic, for the fishing industry, and for the transport of forest produce.

The wants of the people extend besides to timber for their agricultural implements; *keora* for house floors, boxes, &c.; *hantál* for the dunnage of roofs, and *golpatta* for the thatching of the houses. The various uses to which the species in the Sunderbans are put by the people are mentioned in Appendix B of this report.

The Composition and Condition of the Forests.

8. The Reserved Forests of the Sunderbans lie entirely within the Khulna district and are bounded--

Distribution and area.

North—by settled lands;
East—by the Bhola and Baliswar rivers;
South—by the Bay of Bengal; and
West—by the Raimangal and Jabuna rivers.

They comprise an area of 2,092 square miles inclusive of water.

9. The Protected Forests lie entirely within the 24-Parganas district, excepting lot 165 (area, 24 square miles) which lies in the Khulna district, and are bounded—

North—by settled lands;
East—by the Jabuna and Raimangal rivers;
South—by the Bay of Bengal; and
West—by settled lands and the Hooghly river.

They comprise an area of 2,260 square miles inclusive of water.

State of the boundaries.

10. The boundaries of the Reserved Forests are all natural, excepting—

(1) a short length of 1·2 miles separating lots 6 and 7, Kawlia-Barisál, on the eastern side of the Bagirhat Forest, a line maintained by the Department clear of jungle, 15 feet wide, with conical mounds of earth 6 feet high and 4 feet in diameter at base, 100 feet apart;

(2) the northern boundary of lot 164, and the north-western boundary of lots 172 and 169, which are maintained in a state of repair by the lessees of adjacent lots of waste land.

The properties with which the northern boundaries march are either permanently-settled estates, or lands held in fee simple, or grants made under the rules of September 1853, or the following lots leased under the rules of November 1879, namely, lots 216, 223, 224, 225, and 240.

11. The Protected Forests have their boundaries naturally defined by water-channels, except on the north and north-west, where a number of artificial lines of boundary occur. These are demarcated and maintained, under the orders of the Commissioner in the Sunderbans, by the lessees of adjacent lots of waste-land, under the terms of their leases.

The properties with which the northern and north-western boundaries march are either permanently-settled estates, or lands held in fee simple, or grants made under the rules of September 1853, or the following lots leased under the rules of November 1879, namely, lots 11, 16, 36, 67, 87, 90, 110, 111, 115, 116, 122, 123, 135, 138 and 163.

Legal position

12. In 1757 the East India Company obtained administrative rights over 882 square miles of the 24-Parganas south of Calcutta: received a diwáni sanad the next year;

and in 1765 were granted, by the Emperor Alamgir II, Letters Patent converting the grant into an Sltamghá giving perpetual heritable jurisdiction over this and all other territories in Bengal farmed by the Company for the Mogul Empire. The jágir of these lands was granted by the Emperor to Lord Clive in 1759, and confirmed in 1765 for ten years. On the death of Lord Clive in 1774, the East India Company acquired full proprietary right in these lands and their revenues by reversion under this grant. These rights passed into the hands of the Crown in 1858. The Sunderbans were included within district limits in 1861 and 1863.

13. The forests of the Sunderbans were notified as follows :—

(1) Reserved Forests.

The *Bagirhat* forest, with an area of 500 square miles, and the north part of the *Khulna* forest with an area of 385 square miles, total area 885 square miles, were notified under section 2 of Act VII of 1865 on the 15th February 1875 in the *Calcutta Gazette* of the 17th idem, Part I, page 204.

A modification of the eastern boundary of the above was notified on the 5th April 1875 in the *Calcutta Gazette* of the 7th idem, Part I, page 412.

The south part of the *Khulna* forest, with an area of 314 square miles, was notified under section 2 of Act VII of 1865 on the 10th August 1875 in the *Calcutta Gazette* of the 11th idem, Part I, page 1031.

The *Satkhira* forest, with an area of 382 square miles, was notified under section 2 of Act VII of 1865 on the 1st August 1876 in the *Calcutta Gazette* of the 2nd idem, Part I, page 931.

The whole of the above was again notified under section 34 of Act VII of 1878 on the 23rd January 1879 in the *Calcutta Gazette* of the 29th idem, Part I, page 80.

14. The following areas were excluded from the above under section 26 of Act VII of 1878 :—

Bágirhát forest.—Lot 240, with an area of 6 square miles, in notification of the 18th July 1890 published in the *Calcutta Gazette* of the 23rd idem, Part I, page 754, with effect from the 15th August 1890.

Khulna forest.—A part of lot 209, known as "Fiddler's Elbow," with an area of 7 acres, in notification of the 14th April 1883 published in the *Calcutta Gazette* of the 25th idem, Part I, page 339, with effect from date of notification.

(2) Protected Forests.

15. The following areas were notified under section 28 of Act VII of 1878 :—

The *Basirhát* forest.—An area of 1,000 square miles on the 7th December 1878 in the *Calcutta Gazette* of the 11th idem, Part I, page 1298; and an area of 16 square miles on the 10th August 1883 in the *Calcutta Gazette* of the 15th idem, Part I, page 687.

The *Báripúr* forest.—An area of 325 square miles on the 7th December 1878, in the above-mentioned notification of that date.

The *Diamond Harbour* forest.—An area of 526 square miles on the 7th December 1878, in the above-mentioned notification of that date; an area of 7 square miles on the 10th August 1883 in the above-mentioned notification of that date; and an area of 17 square miles on the 12th April 1888 in the *Calcutta Gazette* of the 18th idem, Part I, page 302.

The *Satkhira* forest.—An area of 24 square miles on the 24th February 1879 in the *Calcutta Gazette* of the 26th idem, Part I, page 170.

The *Khulna* forest.—An area of 50 square miles on the 24th February 1879, in the above-mentioned notification of that date; and an area of 1 square mile on the 10th August 1883, in the above-mentioned notification of that date.

There are no blanks nor enclosures, but the areas of both Reserved and Protected Forests, as given above, are inclusive of rivers. The areas are given as they were stated in the notifications, but they have been revised and the correct areas given in Part II of this report.

16. The following areas have been from time to time excluded from the Protected Forests, and transferred by administrative order, to the jurisdiction of the Commissioner in the Sunderbans:—

Name of forest	No. of lot.	Area excluded.	Date of *Calcutta Gazette* notification.
		Acres.	
Basirhat.	138	5,305	18th October 1887.
Do.	135	1,487	27th September 1889.
Do.	124	306	20th December 1889.
Do.	135	1,322	29th July 1890.
Baripur.	122	2,314	23rd January 1889.
Diamond Harbour.	11	3,723	3rd July 1883.
Ditto	16	1,411	23rd June 1884.
Ditto	110	1,488	7th September 1886.
Ditto	116	3,306	1st August 1888.
Ditto	110	1,653	18th September 1888.
Ditto	111	1,653	3rd September 1890.
Ditto	111	3,333	15th October 1891.
Khulna.	216	2,182	7th September 1886.
Do.	224	14,288	28th June 1889.
Do.	223	1,983	14th August 1890.
Do.	223	2,777	3rd September 1890.
Do.	216	7,302	1st December 1890.
Do.	225	11,570	3rd February 1891.

Rights.

17. An enquiry under section 6 of the Indian Forest Act, VII of 1878, has recently been ordered by the Government of Bengal in notification dated the 10th May 1892, published at pages 499 and 500, Part I, of the *Calcutta Gazette* of the 11th idem. It is anticipated that this enquiry will show that the Sunderban Government Forests are altogether free from adverse rights of any description.

Composition and condition of the crop.

18. The principal species in the Sunderban Government Forests are *Súndri* (Heritiera Fomes, *Buch.*), *Pussur* (Carapa moluccensis, *Lam.*), *Amúr* (Amoora cucullata, *Roxb.*), *Keora* (Sonneratia apetala, *Ham.*), *Goran* (Ceriops Candolleana, *Arn.*), and *Gengwa* (Excœcaria Agallocha, *Linn.*).

19. *Súndri* is a gregarious species, and occurs either pure or associated with gengwa, shingar, and other inferior trees throughout the Reserved Forests, and in the Basirhat Block of the Protected Forests; but it only attains to the full measure of its growth in the north and middle portions of the Bagirhat and Khulna forests. In the southern portion of the Reserved Forests the predominating species is gorán, associated with gengwa, keora, the rhizophors, &c.; and although súndri is to be found in this locality, the trees are comparatively few in number, and of inferior description.

Owing to the excessive felling in past years of most of the available timber trees of marketable dimensions in the northern portion of the Reserved Forests, the crop in this portion now consists chiefly of poles. In the other parts of the forest the pole crop is also well represented, trees of 3 feet in girth and upwards being comparatively few.

The natural reproduction of súndri is nearly everywhere excellent. The exploitable size for timber is 3 feet and upwards, breast high. The trees are believed to attain to maturity in 50 or 60 years, when they reach a girth of 5—6 feet, but this point requires verification.

20. *Pussur* is found in low-lying localities, swampy throughout the year, in the Reserved Forests, and in the eastern portion of the Protected Forests, associated with amur, keora, kumia, báen, &c. It is not a gregarious species.

The natural reproduction in the localities where the tree is found is good. The exploitable size is $2\frac{1}{2}$ feet and upwards, breast-high; and it is believed to reach a girth of 5 feet, when it attains to maturity, in 70 years.

21. *Amur* is found on the banks of water-channels and in swampy localities, associated with pussur, báen, &c. In such localities its natural reproduction is good. The exploitable size is $2\frac{1}{2}$ feet in girth and upwards, but trees of these dimensions are remarkably few.

The rate of growth is believed to be the same as that of pussur, and it probably reaches a girth of 4½—5 feet when it attains to maturity.

22. *Keora* is found on or near river banks throughout the Sunderbans.

It is a gregarious species, but is often found associated, on the sea-face with the mangroves, and in the súndri-producing area with ora, gengwa, kumia, &c.

The natural reproduction is excellent. The exploitable size is 3 feet in girth and upwards. The growth is extremely rapid, and it is believed to reach a girth of 9 feet, breast-high, when it attains to maturity, in 35—40 years.

This conjecture is based on the counting of rings of stump-sections as in the case of sundri, pussur, and amur, but the result requires verification.

23. *Gorán* is the principal species of the Protected Forests, and of the southern and western portion of the Reserved Forests.

It forms a dense low crop with innumerable stems averaging 15—20 feet in height. It is chiefly associated with gengwa, and attains to its largest size in the coast forests of the Bagirhat and Khulna ranges. The species is gregarious.

The natural reproduction is excellent. The exploitable size is 1—2 feet in girth, breast-high. The rate of growth has not been ascertained.

24. *Gengwa*, the most widely distributed of all the Sunderban species, attains to its largest size in the northern portion of the Khulna and Bagirhat Forests.

It is found in greatest abundance associated with gorán in the Protected Forests, and in the southern portion of the Reserved Forests.

The natural reproduction is excellent. The exploitable size for posts is 2½—3 feet in girth, breast-high, and for firewood 1½—2 feet. The rate of growth has not been ascertained.

25. The foregoing account of the distribution of the principal species shows that while súndri is found chiefly on islands flooded during the rains with the sweet water of rivers directly connected with the Ganges, gorán is most abundant where tidal influences are felt throughout the year and where the flood-water is either salt or brackish.

Gengwa is found everywhere in association with these two species, while pussur and amur affect very swampy localities, and keora is found chiefly on river banks.

Each island is bordered by a zone of characteristic riparian growth, consisting of ora, kumia, the rhizophors, hantál, golpatta, &c.

26. A list of the useful trees, shrubs, and climbers of the Sunderbans, kindly revised and corrected by Dr. Prain, Curator of the Herbarium, Royal Botanic Gardens, Sibpur, is given in Appendix B of this report.

27. A peculiar feature of the Sunderbans is the absence of undergrowth, except in low-lying localities where patches of pandanus, hargosa, udoban, and young hantál are found. Hence there is no grazing of domesticated cattle, nor any danger from fire.

Injuries to which the crop is liable.

28. Considerable injury is done to the taller trees in the forests by severe nor-westers in April and May, by occasional cyclones during and immediately after the rains, and by the strong and steady winds of the south-west monsoon that markedly affect the trees in the coast-forests, stunting their growth by breaking or bending the tops.

29. The strong rush of water down the rivers in the rains washes away portions of the bank exposed to the set of the current. When the waters subside these banks fall away with the trees growing thereon.

30. The chief injury to the forest has, however, arisen from the uncontrolled operations of the wood-cutters.

These men, who are regular permit-holders, naturally restrict their fellings to the more accessible portions of the forest. They also reject every tree that, after felling or ringing, appears to them to be unmarketable owing to cracks, heart-shakes, or internal decay of any kind. They cut an immense number of saplings every year to form their corduroy paths for the purpose of extracting logs.

31. The injury done by unauthorised felling is inconsiderable compared with that done by the regular permit-holders.

The following table drawn from the annual Forest Administration Reports of Bengal gives the number of cases of unauthorised felling in this division considered serious enough to be taken into court:—

Year.	Number.	Year.	Number.	Year.	Number.
1875-76 ...	7	1881-82 ...	28	1887-88 ...	6
1876-77 ...	216	1882-83 ...	23	1888-89 ..	7
1877-78 ...	131	1883-84 ...	12	1889-90 ...	5
1878-79 ...	46	1884-85 ...	23	1890-91 ...	20
1879-80 ...	18	1885-86 ...	19	1891-92 ..	6
1880-81 ..	17	1886-87 ...	7		

The first permit was issued on the 11th December 1875, and it was some time before the wood-cutters could realise the new conditions. This will account for the large number of cases in 1876-77 and 1877-78.

System of Management.

Past and present systems of management.

32. In 1872-73 and 1873-74 the areas that were afterwards constituted Reserved and Protected Forests were examined by Mr. Home, Deputy Conservator of Forests. Dr. Schlich, then Conservator of Forests, Bengal, considered that the first measures demanded were purely fiscal. It was proposed to establish 25 revenue stations for the issue of permits and collection of dues.

33. The measures taken for maintaining the forest were confined to the Bagirhat Reserve, in which area the felling of sundri trees 3′ 9″ in girth, 4′ 6″ from the ground was prohibited in November 1875.

This prohibition was again notified in 1876 and in 1885, but it has never been enforced: and although no permits for sundri firewood were issued for the Bagirhat Reserve, several sundri trees under 3′ 9″ in girth were annually removed under cover of the permits for sundri timber.

34. Rates, enhanced from time to time, were prescribed for the royalty to be levied on timber and other forest produce removed from the Sunderban Government Forests.

A notice under Rule II of the "Rules for the better management of Government Forests in the Lower Provinces, Bengal," was published in the *Calcutta (Bengali) Gazette* of the 2nd November 1875, and a revised notice under the same rule was published in the *Calcutta Gazette* of the 16th August 1876, Part II, page 790, prescribing the following rates of royalty:—

Sundri timber ...	...	...	1 anna per maund.	
All other kinds ...	...	...	3 pies	„ boat measurement.

The right to collect wax and honey was leased, or granted at the rate of Re. 1 per man for areas for which leases had not been taken.

35. The subsequent notifications regarding rates of royalty are given below, with date of notice extending the same to the Reserved Forests:—

Under Sections 31 and 41 of Act VII of 1878.	Notification dated—	Published in the *Calcutta Gazette* of the—	Part 1, page—	Notice extending the rates to the Reserved Forests.
Sundri timber 1 anna per md. * Other forest produce ½ „ „	22nd April 1879.	23rd idem	375	.....
Sundri, Passur, and *Amir* 1 anna per maund. *Kena* ½ anna per maund * Other forest produce ¼ anna per maund	12th September 1880.	15th idem	632	Dated 20th September 1880, *vide Calcutta Gazette* of 29th idem, Part II, page 1641.

* Boat measurement.

Under Sections 31 and 41 of Act VII of 1878.	Notification dated—	Published in the *Calcutta Gazette* of the—	Part I, page—	Notice extending the rates to the Reserved Forests.
Súndri, *Pussur*, and *Amúr*, 10′ or more in length, 3′ 9″ or more in girth at the butt end, 1 anna per maund. Ditto, 6′—10′ in length and 2′ 3″—3′ 9″ in girth at the butt end, ½ anna per maund. *Keora*, 6′ or more in length, and 2′3″ or more in girth at the butt end, ¼ anna per maund. * Other forest produce ¼ anna per maund. Wax and honey Rs. 1-8 per man per month.	17th September 1883.	26th idem	791	Dated 11th August 1883, *vide Calcutta Gazette* of 5th September, Part II, page 1386.
Súndri, *Pussur*, and *Amúr*, 8′ or more in length, 3′9″ or more in girth at the butt end, 1 anna per maund. " { *Sundri* firewood ½ anna per md. { Other forest produce ¼ „ „ Wax and honey, Rs. 1-8 per man per month.	9th March 1886.	10th idem	194, 195	Dated 10th March 1886, *vide Calcutta Gazette* of 17th idem, Part II, page 424.
Súndri, *Pussur*, and *Amúr*, 8′ or more in length, 3′3″ or more in girth at the butt end, 1 anna per maund. *Goráa*, 8′ or more in length and 3′9″ or more in girth at the butt end, ½ anna per maund. * { *Súndri* firewood ½ anna per md. { Other forest produce ¼ „ „ Wax and honey Rs. 1-8 per man per month.	5th November 1888.	7th idem	941, 942	Dated 26th December 1888, *vide Calcutta Gazette* of 2nd January, Part II, page 43.

* Boat measurement.

The most recent rules under sections 31 and 41 of the Indian Forest Act were published in notification No. 1397 For., dated the 12th April 1892, and took effect from the 1st July 1892. They are reprinted *in extenso* in Appendix F of this report.

36. The present system is practically the same as that heretofore in force. Under it permit-holders are permitted to remove from any portion of the Sunderbar Government Forests, subject to certain restrictions mentioned in the above Appendix, and under the conditions printed on the back of each permit, the forest produce for which they have paid the prescribed fees.

The permit is in the form prescribed in the notification of the 10th December 1889, published in the *Calcutta Gazette* of the 18th idem, Part I, pages 1034-1035, and is in triplicate.

The duplicate is retained as a counterfoil at the station of issue: the triplicate, which bears in addition the word "certificate," is filled up and granted to the permit-holder on his return from the forest to a revenue station with a laden boat, when the cargo is examined and checked, and the original permit taken back and forwarded to the head office of the Division.

The system was devised to secure payment of the prescribed royalties on all forest produce exported from the Government Forests and from leased lands, and was the best possible under the circumstances.

Special works of improvement undertaken. *Roads.*

37. Communications within the Government forests and thence to the nearest timber markets are entirely by water. Within the forests the wood-cutters construct short lengths of corduroy paths to facilitate the extraction of timber. These temporary export paths are extremely numerous and well adapted to answer the purpose in view.

38. The existing buildings of the Sunderban Forest Division are shown in the following table:— *Buildings.*

Station.	Year of construction.	Original cost.	Repairs to the end of 1891-92.	Total cost
		Rs. A. P.	Rs. A. P.	Rs. A. P.
Mud Point ...	1885-86	443 2 1	131 7 3	574 9 4
Shikarpur ...	1892-93	150 0 0	130 4 6	280 4 6
Nalkora ...	1879-80	100 0 0	147 13 6	247 13 6
Miragunj ...	1880-81	100 0 0	198 2 9	298 2 9
Basrah ...	1881-82	150 0 0	122 4 3	272 4 3
Bamanghatta ..	1879-80	3,353 0 0	607 5 1	3,960 5 1
Samokpothe ...	1879-80	2,970 0 0	502 7 3	3,472 7 3
Matlah ...	1885-86	714 2 11	235 4 0	949 6 11
Salikhali ...	1885-86	662 6 8	52 7 6	714 14 2
Bassantpur ...	1877-78	100 0 0	252 1 9	352 1 9
Haldarkhali ...	1886-87	637 9 8	24 15 0	662 8 8
Cobadak ...	1891-92	589 3 3	.....	589 3 3
Burigoalmi ..	1884-85	565 14 10	172 2 6	738 1 4
Cassee-abad ...	1886-87	575 9 1	136 1 11	711 11 0
Banialkhali ...	1884-85	436 8 7	114 0 9	550 9 4
Dhake ...	1885-86	598 13 8	191 1 9	789 15 5
Dacope ...	1888-89	593 1 6	101 4 6	700 6 0
Khulna ..	1887-88	300 0 0	107 15 9	407 15 9
Shella ...	1887-88	599 9 9	207 6 0	806 15 9
Chandnie ..	1884-85	471 14 10	412 3 6	884 2 4
Jewdhan ...	1888-89	569 9 3	102 7 6	672 0 9
Supoti ...	1886-87	300 0 0	131 6 6	461 6 6

The position of the above buildings is shown in the accompanying General Map of the Sunderbans. A station-house is about to be built at Rampura, and an office and a bungalow for the divisional officer at Khulna, the headquarters of the Division.

The Forest Department Flotilla.

39. For inspection purposes there are three steam-launches, namely—

(1) the *Swan*, a twin-screw steel vessel of 78 tons, with surface condensing engines, launched in March 1892. Cost Rs. 35,258;

(2) the *Seal*, a paddle-wheel steel vessel of 54 tons, launched in December 1886.

	Rs.
Original cost	32,969
Repairs to the end of 1891-92	5,718
Total ...	38,687

(3) the *Cygnet*, a paddle-wheel steel vessel of 42 tons, launched in 1876, and first used as a "famine" steamer. She was made over to the Forest Department in 1879. Her cost (not paid by the Department) was Rs. 25,000. Repairs to end of 1891-92 amounted to Rs. 35,347. Total Rs. 60,347.

A *Barge* is attached to the launch *Cygnet*. Original cost Rs. 7,128. Repairs to end of 1891-92 Rs. 3,196. Total Rs. 10,324.

The construction of three *steam-cutters* at Rs. 4,500 each has been sanctioned by the Government of India. One will be attached to each steam-launch to enable the inspecting officers to ascend water-channels too small for the passage of the steamer, but large enough to admit the largest bolios

There are six *patrol boats* that cost Rs. 1,200 each, and 16 *station boats* unsuitable for patrol purposes and used for minor inspection work, for conveying revenue to treasury, and for bringing provisions and fresh water to the revenue stations from the nearest market. They cost Rs. 10,085. Attached to the patrol and station boats are 29 *dinghies* that cost Rs. 2,548. The above are not altogether adequate: three more patrol boats are required, and it also appears advisable to provide at least as many cabin boats as there are stations.

Nurseries and Plantations.

40. An experimental plantation of baobab (Adansonia digitata) and bamboo (Bambusa tulda, and B. balcooa) was formed at Ghoshkali near Dhake in 1876-77 and 1877-78, when

192 seedlings of the first-mentioned species, and 1,190 bamboo offsets, obtained from the Royal Botanic Gardens, Calcutta, were planted at a cost of Rs. 282. All the plants died. On well-drained land, protected by substantial embankments from inundation of tidal water, the plantation would probably have proved a success, but at an excessive cost. No other plantations have been attempted, nor are they required.

41.—*Past Revenue and Expenditure.*

Year.	Revenue.	Expenditure.		Total expenditure.	Surplus.
		Formation, Protection and Improvement of Forests.	Other expenditure.		
	Rs.	Rs.	Rs.	Rs.	Rs.
1875-76 ...	32,722	3,272	12,806	16,078	16,644
1876-77 ...	84,168	9,967	30,200	40,167	44,001
1877-78 ...	1,73,909	5,238	28,215	33,453	1,40,546
1878-79 ...	1,72,546	6,293	29,940	36,233	1,36,313
1879-80 ...	1,99,448	7,457	37,007	44,464	1,54,984
1880-81 ...	2,79,406	15,863	49,594	65,257	2,14,151
1881-82 ...	3,14,976	4,524	64,980	69,504	2,45,472
1882-83 ...	3,69,249	6,320	54,578	60,898	3,08,351
1883-84 ...	3,35,072	11,132	48,964	60,096	2,72,976
1884-85 ...	2,84,841	6,589	53,600	60,189	2,24,652
1885-86 ...	3,47,447	5,931	57,503	63,434	2,84,013
1886-87 ...	3,76,045	14,803	79,797	94,599	2,81,446
1887-88 ...	3,97,301	6,824	70,125	76,749	3,20,552
1888-89 ...	4,36,276	7,644	72,470	80,114	3,56,162
1889-90 ...	4,85,458	9,996	68,668	78,664	4,06,794
1890-91 ...	4,10,483	5,816	71,895	77,711	3,32,772
1891-92 ...	4,62,024	21,380	94,164	1,15,544	3,46,480

The figures in column 3 showing the annual expenditure on the "formation, protection, and improvement of forests" are made up as follows to end of 1879-80:—

$\frac{1}{3}$VI—Live-stock, stores, tools and plant,
+VII—Communications and buildings,
+VIII—Demarcation, improvement and extension of forests,
+$\frac{1}{3}$B—Establishments.

From 1880-81 to 1891-92, both years inclusive, the figures have been taken from the Bengal Forest Administration Reports.

Utilization of the Produce.

Marketable products.

42. The following kinds of forest produce are extracted from the Sunderban Government Forests:—

Timber.

Timber in the log suitable for conversion into rafters, posts, planking, etc., is afforded by súndri, pussur, amúr, keorá, gorán, gengwá, báen, bhádala, dhundol, dámblá, kirpá, shingar, miriám, kánkrá, jijir, gáb, and banbokal.

Firewood.

The following species are cut for firewood:—Súndri, keorá, gorán, gengwá, báen, bhádala, kirpá, shingar, kánkrá, núná-gách, kedár-súndri, dimal, núncha, karanja, panchioli, kúmiá, banjám, goria, bhárá, orá, bará-chánd, koilshá, gorshingieh, bút-ráj, bámanhatti, batúl, nún-bhántwi, harinhárá, and zir.

Other Forest Produce.

For thatching purposes: golpatta, hantál and udoban; fibre for ropes: bhola, dúmblá, goele-lota, kelia-lota, súndri-lota, golpatta, hoglá, unú, dhekwa, and udoban; baskets: nal, hogla, sachi-bet, and gola-bet; oils, dyes, tans, or medicinal extracts: the gum of báen; the sap of gengwá; the fruit of gáb, karanja, ban-nebú, nátá, dhúndol, and dákúr; the bark of gorán, shongrál, goriá, kánkrá and bhárá; lime: kastúrá, jhinái, and jhongrá shells; miscellaneous: wax and honey.

Quantities of these products yielded annually in past years.

Reserved Forests.

Year.	Timber.						Fuel.	Other Products.						
	Sundri.	Pussur.	Amur.	Keora.	Goran.	Other kinds.		Golpatta.	Cane.	Nal.	Hantal.	Shells.	Wax and honey.	Other kinds.
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
1875-76 ...	70,869	...	...	...	74,355	...	12,30,368	2,32,429	1,563	80,136	2,128	1,451	...	...
1876-77 ...	1,67,745	921	...	2,637	58,551	...	23,71,973	10,90,052	4,548	44,780	...	42,080	156	...
1877-78 ...	6,50,182	49,295	15,511	42,945	3,57,992	31,951	54,63,708	23,10,438	7,579	35,941	7,625	1,03,245	2,124	...
1878-79 ...	6,98,622	91,257	14,079	1,04,733	5,89,977	19,250	53,24,174	20,88,810	8,299	30,934	825	65,473	1,936	56
1879-80 ...	8,08,107	1,57,198	50,899	1,16,103	7,62,247	25,472	53,03,286	22,25,153	4,265	1,06,136	1,250	1,24,601	1,654	...
1880-81 ...	14,86,115	36,988	45,806	1,19,500	7,82,263	22,225	65,76,889	20,00,568	3,226	1,07,612	9,035	99,915	3,631	...
1881-82 ...	27,44,498	57,115	10,246	1,53,117	11,09,443	37,351	74,38,201	30,94,852	3,696	85,709	1,11,975	1,49,079	9,394	262
1882-83 ...	25,73,531	48,696	1,995	1,66,283	9,69,069	48,069	69,68,705	35,16,515	2,730	1,18,959	2,150	1,22,220	4,130	533
1883-84 ...	18,13,718	75,719	2,720	3,05,286	9,01,023	37,703	73,57,111	28,34,400	1,896	1,06,576	3,151	1,19,993	4,288	...
1884-85 ...	15,20,603	36,800	41,108	1,39,357	8,33,787	81,056	69,81,896	27,72,977	2,071	85,871	2,075	1,14,287	3,068	111
1885-86 ...	20,13,080	49,157	28,485	1,63,578	9,14,183	1,19,779	72,35,651	33,44,246	2,000	50,811	321	1,36,161	3,073	253
1886-87 ...	25,25,737	69,389	25,264	1,40,120	7,78,692	1,45,808	54,52,014	37,02,016	3,884	1,69,316	704	94,286	2,373	...
1887-88 ...	25,80,945	87,524	3,733	2,35,819	7,78,741	1,12,071	58,25,187	35,35,424	3,520	87,956	3,256	1,83,956	7,220	...
1888-89 ...	29,89,954	79,900	5,263	1,97,324	6,72,456	3,42,297	56,42,754	30,39,936	3,008	93,524	3,448	65,792	10,023	...
1889-90 ...	37,67,017	1,11,493	7,744	1,64,993	7,09,978	3,75,116	54,29,993	35,41,184	2,934	1,10,144	16,832	81,024	7,044	512
1890-91 ...	24,84,328	80,901	4,023	2,21,854	6,39,872	4,19,776	58,77,920	34,27,964	1,949	2,40,240	12,415	90,432	3,849	896
1891-92 ...	30,81,340	1,00,761	7,652	3,26,816	6,24,000	4,11,994	44,31,093	33,35,824	4,352	73,168	4,730	45,959	7,054	...

Protected Forests.

Year.	Timber.						Fuel.	Other Products.						
	Sundri.	Pussur.	Amur.	Keora.	Goran.	Other kinds.		Golpatta.	Cane.	Nal.	Hantal.	Shells.	Wax and honey.	Other kinds.
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
1870-80 ...	1,304	16,712	...	...	58,361	4,531	5,10,755	...	...	...	1,36,705	42,107	80	1,172
1880-81 ...	67	7,237	...	1,401	1,92,447	3,050	4,62,711	950	43,436	...	1,47,116	...	2,488	...
1881-82 ...	3,380	751	...	923	1,94,725	9,803	4,38,251	2,260	...	...	1,03,275	99,905	5,593	400
1882-83 ...	1,223	5,734	...	214	75,650	11,128	6,26,037	2,690	...	...	84,925	86,975	2,018	...
1883-84 ...	...	814	...	1,257	58,236	8,350	8,05,632	...	...	...	66,752	82,648	2,169	...
1884-85 ...	...	627	...	1,225	68,755	33,585	2,99,097	...	...	...	74,050	88,454	1,749	...
1885-86 ...	640	4,758	...	3,486	66,446	34,868	3,82,941	30,375	...	61,653	1,03,200	84,740	3,496	...
1886-87 ...	91	20,900	...	...	1,25,984	52,651	3,75,032	58,560	448	1,344	1,05,312	58,406	3,559	376
1887-88 ...	9,067	...	...	144	1,42,855	75,876	1,53,393	4,864	192	1,17,376	1,10,976	10,708	2,832	...
1888-89 ...	22,216	4,302	80	892	54,208	47,616	3,52,460	40,768	768	21,712	20,384	62,800	3,153	...
1889-90 ...	16,528	15,302	...	4,992	21,632	81,216	5,43,136	81,664	...	1,09,248	59,728	43,344	9,328	...
1890-91 ...	32,887	16,176	256	7,563	46,176	1,40,864	11,13,120	97,536	3,200	29,752	1,06,112	65,408	3,618	...
1891-92 ...	704	2,352	...	9,678	3,088	1,80,809	22,06,336	1,53,600	...	...	1,10,720	72,896	9,018	...

Quantities and Value of these products yielded since 1888-89.

1888-89.

Forest.	1.—Bagirhat.		2.—Khulna.		Total.		3.—Satkhira.		4.—Protected.		Grand Total.	
Description of Forest produce—	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.
Timber—												
Sundri	22,46,342	1,40,384	10,05,800	62,825	32,54,142	2,03,209	85,292	5,337	27,216	1,701	33,67,150	2,10,447
Pussur	15,183	949	54,096	3,381	69,279	4,330	10,016	626	4,992	312	84,292	5,268
Amur	2,944	184	3,008	188	5,952	372	...	...	80	5	6,032	377
Keora	50,048	782	30,048	907	79,096	1,189	1,20,128	1,877	832	13	1,97,056	3,078
Goran	5,31,280	9,110	1,01,009	2,054	6,32,289	11,175	30,500	599	54,208	1,150	7,26,688	12,924
Other kinds	29,233	1,052	92,032	1,408	1,21,265	2,520	82,112	1,285	47,616	744	3,91,013	4,547
Total ...	29,06,965	1,52,700	12,81,384	70,995	41,80,439	2,23,995	3,47,348	9,722	1,34,944	3,925	46,72,231	2,36,642
Firewood—												
Sundri	...	...	18,01,824	56,301	18,01,824	56,301	4,65,900	14,825	17,472	546	22,85,096	71,472
Other kinds	6,30,016	9,844	11,70,112	18,283	18,00,128	28,127	15,72,792	24,578	3,64,928	5,702	37,38,048	58,407
Total ...	6,30,016	9,844	29,71,736	74,584	36,01,752	84,428	20,40,692	39,403	3,82,400	6,248	60,25,144	1,29,879
Minor produce—												
Golpatta	2,30,016	3,594	16,06,896	25,014	18,30,912	28,608	2,00,024	18,391	40,768	637	20,59,704	48,136
Cane	960	15	2,944	32	3,904	47	...	...	768	12	4,776	2,934
Nal	29,184	456	64,640	1,010	93,824	1,466	...	...	91,712	1,433	1,85,536	2,899
Hantal	448	7	3,200	50	3,648	57	45,120	705	92,800	1,556	1,41,568	1,818
Bhela	13,232	258	5,440	85	20,672	322	...	...	99,584	1,659	1,20,256	1,981
Wax and honey ...	662	331	3,648	1,960	4,660	2,309	5,462	2,731	52,800	826	1,18,922	5,866
Other kinds	...	...	...	...	...	...	...	...	3,168	1,679	13,230	...
Total ...	2,76,502	4,641	16,89,162	28,160	19,56,664	32,801	12,59,906	22,327	3,83,760	6,942	56,05,992	61,179
Grand Total ...	...	1,67,185	...	1,73,039	...	3,40,224	...	71,252	...	16,215	...	4,27,691

1889-90.

Forest.	1.—Bagirhat.		2.—Khulna.		Total.		3.—Satkhira.		4.—Protected.		Grand Total.	
Description of forest produce—	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.
Timber—												
Sundri	20,80,761	1,30,048	16,20,048	1,01,253	37,00,809	2,31,301	66,308	4,138	16,528	1,033	37,83,545	2,36,472
Pussur	80,621	1,876	65,468	4,088	95,429	5,964	16,064	1,004	15,392	962	1,26,885	7,930
Amur	1,296	81	6,448	403	7,744	484	...	...	...	...	7,744	484
Keora	18,240	285	14,538	227	32,778	512	1,32,224	2,066	4,992	78	1,69,994	2,656
Goran	5,32,102	16,630	1,13,176	3,536	6,50,358	20,323	59,040	1,845	71,632	676	7,31,010	22,844
Other kinds	80,022	1,250	2,20,648	3,552	3,06,060	4,782	62,056	1,079	81,216	1,269	4,49,332	7,130
Total ...	27,42,402	1,50,170	20,50,656	1,13,196	47,93,148	2,63,366	3,42,592	10,152	1,36,760	4,018	52,75,500	2,77,516
Firewood—												
Sundri	...	...	17,32,540	54,142	17,32,540	54,142	4,20,052	13,126	8,864	277	21,61,456	67,545
Other kinds	5,24,525	8,196	10,98,432	17,168	16,22,957	25,359	16,94,464	26,476	5,54,272	8,848	38,71,693	60,683
Total ...	5,24,525	8,196	28,30,972	71,305	33,55,497	79,501	21,14,516	39,602	5,63,136	8,625	60,13,149	1,27,728
Minor produce—												
Golpatta	4,41,024	6,891	15,20,128	23,752	19,61,152	30,643	13,80,052	21,563	81,664	1,276	34,22,848	53,482
Cane	...	...	2,304	36	2,304	36	...	...	...	...	2,304	36
Nal	45,120	705	65,924	1,016	1,10,144	1,721	...	...	1,09,248	1,707	2,19,392	3,428
Hantal	...	...	16,832	263	16,832	263	...	...	89,792	1,403	1,06,624	1,666
Shells	20,983	327	26,048	407	46,976	734	34,048	532	43,264	676	1,24,288	1,942
Wax and honey	1,700	895	3,504	1,752	5,294	2,647	1,750	875	9,328	4,664	16,372	8,186
Other kinds	512	8	...	...	512	8	...	...	...	...	512	8
Total ...	5,09,375	8,826	16,33,840	27,226	21,43,214	36,052	14,15,850	22,970	3,33,296	9,726	38,92,340	68,748
Grand Total ...	...	1,67,192	...	2,11,727	...	3,78,919	...	72,704	...	22,369	...	4,73,992

1890-91.

Forest.	1.—Bagirhat.		2.—Khulna.		Total.		3.—Satkhira.		4.—Protected.		Grand Total.	
Description of forest produce—	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.
Timber—												
Sundri	10,09,719	65,107	14,14,400	88,400	24,24,119	1,51,507	60,268	3,763	23,887	1,430	25,07,214	1,56,700
Pussur	33,809	2,113	43,104	2,694	76,913	4,807	3,888	243	10,178	636	90,977	5,686
Amur	678	42	3,296	205	3,974	248	43	3	256	16	4,273	267
Keora	60,224	941	1,20,384	1,881	1,80,608	2,822	41,216	644	7,552	118	2,29,376	3,584
Goran	3,77,284	11,187	1,41,824	4,427	4,99,008	15,594	1,40,864	4,402	46,176	1,443	6,86,048	21,439
Other kinds	48,768	762	2,70,016	4,219	3,18,784	4,981	1,09,992	1,718	1,40,864	2,201	5,69,640	8,899
Total ...	15,11,182	78,152	19,92,224	1,01,807	35,03,406	1,79,959	3,47,216	10,633	2,27,911	5,844	40,78,533	1,96,436
Firewood—												
Sundri	...	...	15,32,000	47,875	15,32,000	47,875	5,90,400	18,450	1,09,866	3,433	22,32,266	69,758
Other kinds	5,15,520	8,055	20,00,000	31,250	25,15,520	39,305	8,40,000	13,125	10,03,264	15,676	43,58,784	68,106
Total ...	5,15,520	8,055	35,32,000	79,125	40,47,520	87,180	14,30,400	31,575	11,13,130	19,109	65,91,050	1,37,864
Minor produce—												
Golpatta	5,46,112	8,533	20,01,792	31,278	25,47,904	39,811	8,80,000	13,750	97,856	1,524	35,25,440	55,085
Cane	...	...	1,000	25	1,000	25	...	...	3,200	50	4,200	75
Nal	1,96,608	3,072	44,032	688	2,40,640	3,760	...	...	26,752	418	2,67,392	4,178
Hantal	2,624	41	9,792	153	12,416	194	...	...	1,06,112	1,658	1,18,528	1,852
Shells	11,968	187	15,040	235	27,008	423	23,424	366	65,408	1,022	1,15,840	1,810
Wax and honey	667	333	914	457	1,581	790	2,068	1,034	9,518	4,759	13,167	6,583
Other kinds	448	7	448	7	896	14	...	...	...	...	896	14
Total ...	7,58,427	12,173	20,73,018	32,343	28,32,045	45,016	9,05,492	15,150	3,08,526	9,431	40,46,063	69,597
Grand Total ...	...	98,380	...	2,13,275	...	3,12,155	...	57,358	...	34,384	...	4,93,897

1891-92.

Forest.	1.—Bagirhat.		2.—Khulna.		Total.		3.—Satkhira.		4.—Protected.		Grand Total.	
Description of forest produce—	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.
Timber—												
Sundri	18,66,382	1,16,649	11,01,392	68,837	29,67,774	1,85,486	83,536	5,221	704	44	30,52,014	1,90,751
Pussur	41,385	2,577	55,718	3,482	96,253	6,059	3,808	238	2,352	147	1,03,113	6,444
Amur	1,728	108	5,024	370	7,652	478	...	...	...	...	7,652	478
Keora	78,208	1,222	22,528	352	1,00,736	1,574	1,26,080	1,970	9,408	147	2,36,224	3,691
Goran	3,46,480	10,640	1,78,903	5,425	5,14,080	16,065	1,09,920	3,435	8,928	279	6,32,928	21,979
Other kinds	64,896	1,014	1,27,696	3,964	2,22,592	5,478	1,63,312	2,958	1,80,800	2,928	5,86,704	9,361
Total ...	23,03,079	1,32,210	15,16,388	80,950	39,09,787	2,13,140	5,12,656	13,822	2,02,192	5,545	46,24,635	2,32,204
Firewood—												
Sundri	...	...	10,71,680	33,490	10,71,680	33,490	2,17,696	6,803	6,00,556	19,048	18,89,912	59,340
Other kinds	4,09,280	6,395	15,34,912	23,983	19,44,192	30,378	11,97,440	18,710	15,56,666	24,350	47,38,452	74,088
Total ...	4,09,280	6,395	26,06,592	57,473	30,15,872	63,868	14,15,136	25,512	22,06,326	43,998	66,37,344	1,33,378
Minor produce—												
Golpatta	6,88,784	9,981	15,83,744	24,746	22,72,528	34,727	11,15,806	17,389	1,13,606	2,400	34,89,054	54,516
Cane	2,112	33	2,240	35	4,352	68	...	...	...	...	4,352	68
Nal	25,984	406	65,184	883	79,168	1,237	...	...	...	...	79,168	1,237
Hantal	192	3	4,544	71	4,736	74	...	...	1,10,720	1,730	1,15,456	1,804
Shells	14,592	228	9,280	145	23,872	373	22,080	345	72,896	1,139	1,18,848	1,857
Wax and honey	1,344	672	322	161	1,666	833	5,378	2,689	9,618	4,809	16,662	8,331
Other kinds	...	...	...	...	...	...	...	...	...	...	...	...
Total ...	6,83,008	11,323	16,65,314	25,989	23,36,322	37,312	11,43,264	20,423	3,46,834	10,078	36,23,570	67,813
Grand Total ...	...	1,49,928	...	1,64,392	...	3,14,320	...	59,757	...	59,618	...	4,33,695

Average annual value of these products since 1875-76:—

Description of product		Reserved Forest.	Protected Forest.
		Rs.	Rs.
Timber ...	*Sándri* ...	1,08,509	431
	Sussur ...	2,912	364
	Amúr ...	585	2
	Keora ...	2,698	34
	Gorán ...	12,535	1,453
	Other kinds ...	1,752	664
Fuel ..	.. ...	96,922	7,793
Other Products ...	*Golpatta* ...	41,572	424
	Cane ...	55	62
	Nal ...	1,444	557
	Hantal ...	180	1,498
	Shells ...	1,554	602
	Wax and *honey*	1,994	1,814
	Other kinds ..	2	2
	Total ...	2,72,694	15,700
	Grand Total ...	2,88,394	.....

43. Rivers. *1.* The *Hooghly*, formed by the union of the Bhágiráthi and Jellinghi rivers near Nadia, has a course of 95 miles to Calcutta, and thence 90 miles to the sea. After passing Calcutta it receives the Damúda, Rúpnaráin and Haldi rivers from the west, but none of any importance from the east. On the east side of Saugor Island it forms the Muriganga channel or Arratola river, which runs almost due north and south from Mud Point to Dhobelát Island.

Lines of export.

2. Proceeding eastwards, the next important river is the *Sabtamúkhi*, which rises near Sultanpur, and has a tortuous course of about 50 miles. It is connected with the Muriganga channel by the Gúgúdanga gang and the Doágra khál.

3. The *Thákúrán*, also called near its mouth the Halúri or Jamíra river, properly rises near Jamagar, and rapidly increasing in volume, flows into the Bay of Bengal after a course of 50 miles. It is connected with the Sabtamúkhi by the Moralgang, Kumária, and other kháls used by woodcutters, and with the Calcutta canals by the Kúltolla and Piáli nadis.

4. The *Mutlah*, formed by the junction, at Port Canning, of the Bidhyadhari, Khuratya and Rampúra kháls, thence flows for 60 miles to the sea. It is navigable throughout its course for large ocean-going vessels. It is connected with the Calcutta canals by the Bidhyadhuri, Piáli nadi, &c., and with the rivers and channels to the north-east by the Rampúra khál, and by the Bidda river and its numerous affluents.

5. The *Guasábá*, formed in the midst of a network of channels between the upper portion of the Mutlah river and the Raimangal, has a course of about 45 miles. It is directly connected with the Mutlah by the Netadupáni

6. The *Raimangal* has a course of about 50 miles from Sahebkháli to the sea. It is connected with the Guasába river by the Terábanka and Haribhánga, with the Rampúra khál by the Barákálágáchya, and with the Jabúna river by the Barákúlia, Kalindi nadi, Atthárabanka, and other kháls. It separates the Reserved from the Protected Forests of the Sunderbans.

7. The *Jabúna* commences at Kishanganj, and joins the Raimangal near its mouth after a course of about 200 miles.

8. The *Molingchu* rises near Halderkháli (where it is known as the Isamati), and flows through the Satkhira forest for 50 miles before it joins the Bárápunga river near the sea. It is connected with the Jabúna river by the Fringi, Abúri, and other kháls.

9. The *Arpangassia*, formed by the junction of the Colpattu and Cobaduk rivers near Burigoálni, flows for about 40 miles between the Satkhira and Khulna ranges and is known in its lower reaches as the Bárápúnga. It is connected with the Molingchu river by the Arabibanki, Solapati, and other kháls.

10. The *Sipsa*, formed at Delúti by the junction of several kháls, some of which connect it with the Cobaduk on the west, and others with the Bhadder on the east, flows for about 40 miles, when it divides into the Mandabári, Moazál, and Hondurás rivers, which again unite to form the Múrjhata river. It is connected with the Arpangassia by the Batlagáng, Hansurás khál, &c.

11. The *Bhadder*, flowing out of the Cobaduk river at Jhinárgách near Jessore, enters the forest reserve at the north-end of the Sútarkháli, and then flows for 25 miles to its junction with the Sipsa river.

12. The *Pussur* flows out of the Bhyrab at Khulna, and thence for 85 miles to the sea. It is connected with the Bhadder river by the Chunkori, Bajua, Laodobe, Lauta, Bará-Jongária, Bori, Arpangassia, and Mángi kháls, and with the Sipsa by the Cháila-Bogi khál.

13. The *Bangárá* flows from the Pussur at a point about 20 miles from the mouth of the latter, for a distance of 16 miles to the sea. It receives the Kágá, Bará Shiálá and Shella rivers. Connecting these rivers with the Pussur on the west, and the Bhola on the east, is a network of rivers and kháls of great importance for the extraction of forest produce from the Bágirhát forest. The principal of these are the Khúrma, Chachangáng, Andramoni, Mrigyamári, Shellagáng, Shiálá, Aroaborigáng, Ariabánki, Char Nangúli, Pankassia, Harintáná, Ghosiángri, Pútia, Kátá, Bentmori and Chandésar.

14. The *Bhola* commences as a distinct river near Rámpál, but is connected on the north with the Bhyrab and Baliswar river by a network of kháls. After a course of 40 miles it joins the Pankassia near the junction of that river with the Haringháta.

15. The *Baliswar*, called the Haringháta near the sea, leaves the Ganges near Pabna, and for a considerable portion of its course is known as the Modhumati. It forms the eastern boundary of the Reserved Forests from the Bogi khál southwards, and separates the Khulna from the Backergunge district. It is connected with the Bhola river by the Jewdhárá, Chipabári, Dhanságar, Saronkhola, and Sápala kháls, and with the timber markets of the Backergunge district by the Kocha, Haltua, and Bishkháli rivers.

The most important rivers are the Hooghly, Mutlah, Raimangal, Jabúna, Arpangassia, Sipsa, Pussur, Bhola and Baliswar, with their connecting waterchannels.

44. Firewood is usually taken direct to Calcutta from the forests *viá* the Rampúra khál and the Bidhyadhari and Báliaghatta canals. Keora logs, poles, and miscellaneous minor forest produce, are also taken by this route

Sundri timber is first exported to the markets of the Backergunge and Khulna districts, and is there sawn into rafters, planks, mast-pieces, etc., or converted into boats. These boats are then laden with jute, grain, or sawn timber, and taken to Calcutta, where they are sold with their cargoes to grain or timber-merchants.

River route from Backergunge to Calcutta.

The river route followed by these boats from the Backergunge district to Calcutta is *viá* the Kowkháli and Damúda kháls, and the Baliswar and Bhyrab rivers to Khulna; thence *viá* the Pussur river, Báitaghatta canal, and Bhadder river to Delúti; and thence *viá* the Paikgatcha khál, Cobaduk river, Moricháp khal, and Bánsthalli and Káshkháli canals to Bassantapur.

Here the route divides into two, namely:—

(1) the *northern*, or *inner* passage (taken during the rains, and only available for small boats), *viá* the Jabúna river to Hosainábád; thence *viá* the Dánsra Saikúni, Gobragáng, Bhowánipurkátá, Helaucha, Akratola, Ghipokur, Sealdah, Kultigáng, and Bhangar kháls to Káutátala-mohána; thence *viá* the Báliaghatta canal to Sealdah, or *viá* the Taurdah gáng and Tolly's nala to Kidderpore;

(2) the *southern*, or *outer* passage, *viá* the Kalindi nadi, Sahebkháli and Barákúlia kháls to the junction of the Raimangal river with the Barákálágátchya, and up the latter and along the Rámpúra khál and Atthárabanka to Mútlah; thence *viá* the Bidhyadhari canal to Samokpotha; thence *viá* the Báliaghatta and Circular Road canals to Sealdah, or *viá* Tolly's nala to Bhawanipur and Kidderpore.

Markets.

45. The markets for forest produce are as follow:—

24-Pargawas district.—Calcutta (Bhawánipur, Kidderpore, Sealdah and Báliaghatta), Mustáfápur, Goburdanga, Badúria, Basra, Basirhat, Naihati, Dhásá, Súrjyapur, Nalua, Khári, Utterbágh, and Diamond Harbour.

Jessore district.—Kosbabpur.

Khulna district.—Morelgunge, Bágirhát, Chalna, Dúmria, Khulna, Tálá, Magurá, Borodál, Kálároa, Noabánki, Kháujia, Núu-nagar, and Debhátá.

Backergunge district.—Jhálokáti, Barsakári, Sarúpkáti, Niamati, and Tezkáti.

The position of the above markets is shown in the accompanying General Map of the Ganges Delta.

46. Timber and other forest produce of the following description is taken to the markets:—

TIMBER.

Logs.—*Súndri* to all the Backergunge markets, and to all the Khulna markets except Núu-nagar and Debhátá: *Keora* to Jhálokáti, Sarúpkáti and Niamati; short pieces to Calcutta: *Pussur* to Khánjia: *Gengwá* to Calcutta.

Posts.—*Súndri* to Chalna: *Gorán* to all markets of Backergunge and to Calcutta: *Amár* to Calcutta: *Kirpa* to Calcutta, Surjyapur, Nalua, Khári, and Diamond Harbour.

FUEL.

Súndri to Sarúpkáti, Barsakáti, Chalna, Dúmria, Khulna, Keshabpur Tálá, Magura, Borodál, Kháujia, Núu-nagar, Calcutta, Mustáfápur, Gobardanga, and Basirhát: *Gorán* to Sarúpkáti, Khulna, Calcutta and Basirhát; *Gengwá* to Calcutta, Basra, Dhásá, Surjyapur, Khári, and Utterbágh: *Other kinds* to Calcutta, Basra, Dhásá, and Surjyapur.

OTHER PRODUCTS.

Golpatta to Sarúpkáti, Niamati, Barsákáti, Bágirhát, Chalna, Khulna, Kesabpur, Dúmria, Tálá, Magura, Gobardanga, Badúria, Kálároa, Núu-nagar, and Calcutta: *Nal* to Bagirhát: *Hantái* to Nalua and Diamond Harbour: *Shells* to Jhálokáti, Niamati, Sarúpkáti, Debhátá, Naihátí, and Diamond Harbour: *Wax* and *Honey* to Jhálokáti, Barsákáti, Niamati, Noabánki, Kháujia, Basra, Dhebhátá, Dhásá, Khári, and Diamond Harbour: *Cane* to Chalna.

Mode of extraction and its cost.

47. The bolios, or boats used for the purpose of bringing out timber from the Sunderban Government Forests, are taken up the minor water-channels as far as they will go. The wood-cutters then proceed in their dinghies up the smaller khals that lead into the heart of the forest, and having selected a suitable place on the river bank, cut paths 3 feet wide and about a quarter of a mile long from the river bank straight into the forest. These paths are corded with saplings laid on the ground across the path at distances of about 3 feet.

The logs, with the bark on, are dragged from the forest and along the corduroy paths to the bank of the small khal, and then taken two at a time, lashed one on either side of the dinghy, to the place where the bolio is at anchor.

As green súndri timber will not float, logs of this species are either loaded on the boat, or immersed in the water and slung by jute ropes to the ends of poles called "dabbás," 40—70 feet long, placed across the bolio.

The petioles of the golpatta palm are sometimes attached to the súndri logs to assist their flotation.

A boat of 500 maunds capacity, intended to bring out 50 logs in two months, is valued at Rs. 800. The hire for such a boat is Rs. 10 per mensem. The outlay in exporting 50 súndri logs is:—

	Rs.	a.	p.
Hire of boat @ Rs. 10 per mensem for two months ...	20	0	0
Pay of 5 men @ 6 each „ „ „ ...	60	0	0
Provision allowance of 5 men @ 2 each „ ...	20	0	0
Royalty on 750 running feet @ 1¼ annas per foot ...	58	9	6
Total ...	158	9	6

48. Fire wood is usually exported in large bolies of 1,000—2,000 maunds capacity. The straightest and best stems are selected, as these pack more easily, and compactly. To steady the boats, jhools, or side pieces, are lashed one on each side of the boat by ropes made of jute, or of the fibrous inner bark of certain climbers.

A boat of 1,000—2,000 maunds capacity is valued at Rs. 1,500—3,000. The hire of such a boat is Rs. 20—30 per mensem. The outlay in exporting 1,000 maunds sundri firewood is:—

	Rs.	A	P.
Hire of boat @ Rs. 20 per mensem for two months ..	40	0	0
Pay of 4 men @ 8 each „ „ „ ...	64	0	0
Provision allowance of 4 men @ 2 each „ .	16	0	0
Canal dues on a 1,000-maund boat @ 1½ pie per maund each way	15	10	0
Rent for stacking firewood on ground alongside canal ...	9	2	0
Royalty on 1,000 maunds sundri firewood @ 9 pies per maund	46	14	0
Total ...	191	10	0

49. The *net value* of each class of forest produce is roughly indicated by the figures given in the preceding paragraphs taken in connection with the following statement of market values :—

Net value of each class of produce.

SUNDRI—

(i) *Logs*—

Calcutta	Rs. 4 to Rs. 10 per log.
Kalaroa and Khanjia ...	„ 4 „ 6 „
Dumria and Khulna	„ 3 „ 8 „
Keshabpur, Tala, Magura, Borodal, and Gobardanga ...	„ 3 „ 6 „
Jhalokati, Sarupkati, Niamati, Baisakati, and Terkati	„ 2 „ 6 „
Moidalganj, Bagirhat, Chalna, and Mustafapur	„ 2 „ 4 „

(ii) *Posts*—

Chalna	8 annas each, or Rs. 50 per 100 posts.

(iii) *Firewood*—

Sarupkati	Rs. 20 to Rs. 30 per 100 maunds.
Keshabpur, Tala, Magura, Borodal, Gobardanga, Calcutta .	„ 25 „ 30 „ „
Baisakati	„ 16 „ 30 „ „
Basra, Salkia, and Baidyabati ...	„ 25 „ 28 „ „
Chalna, Mustafapur, Dumria, and Khulna	„ 20 „ 25 „ „
Bashat	„ 20 „ 22 „ „
Baduria, Khanjia and Nun-nagar ..	„ 20 per 100 maunds.

PUSSUR—

(i) *Logs*—

Khanjia	„ 3 Rs. 4 per log.

(ii) *Posts*—

Chalna, Dumria, Khulna, Keshabpur, Tala, Magura, and Borodal ..	„ 60 „ 125 per 100 posts.
Noabanki and Basra	„ 30 „ 40 „ „

KEORA—

Logs—

Jhalokati, Sarupkati, and Niamati .	Re. 1 „ 3 per log.
Chalna	„ 1 „ 2 „
Basra	8 annas to Re. 1 „

GENGWA—

(i) *Logs*—

Calcutta	Rs. 3 to Rs. 4 „

(ii) *Firewood*—

Calcutta	„ 20 „ 26 per 100 maunds.
Basra and Salkia	„ 20 per 100 maunds.
Dhara, Surjyapur, and Utterbegh ...	„ 12 „ „
Khari	„ 8 „ „

GORAN—

(i) *Poles*—

Calcutta	Rs. 20 to Rs. 25 per 100 poles.
Jhalokati, Sarupkati, Niamati, and Tojkati	„ 16 „ 25 „ „

(ii) *Firewood*—

Calcutta	„ 24 „ 30 per 100 maunds.
Sarupkati and Basra	„ 22 „ 28 „ „
Salkia and Basirhat	„ 27 per 100 maunds.
Khalna	„ 20 „ „

AMUR—

Poles—

Calcutta	„ 15 to Rs. 20 per 100 poles

KIRPA—

(i) *Poles*—

Calcutta, Surjyapur, Debhata ...	„ 12 „ Rs. 25 per 100 poles.
Nalua, Khari	„ 12 per 100 poles.
Diamond Harbour	„ 6 „ „

(ii) *Firewood*—

Calcutta, Baduria	„ 20 to Rs. 26 per 100 maunds.

MISCELLANEOUS FIREWOOD—

Calcutta	„ 15 „ 26 „ „
Basra	„ 12 „ 20 „ „

TOLPATTA—

Ghusri	Re. 1 per 100 leaves.
Nun nagar, Gobardanga, Baduria, and Kalaroa	12 annas to Re 1 per 100 leaves.
Calcutta	12 „ .. „ „
Dumria, Khulna, Kesabpur, Tala, Magura	8 „ to 12 annas „ „
Sarupkati, Niamati, Barsakati, and Bagirhat	8 „ per 100 leaves.

NAL—

Bagirhat	2 annas 3 pies per 100 stems

HANTAL—

Utterbagh	Rs. 15 per 1,000 leaves; 10 annas per 100 stems
Nalua	„ 10 per 1,000 leaves.

SPELLS—

Naihati	„ 38 per 100 maunds.
Ghusri	„ 30 „ „
Diamond Harbour	„ 25 „ „
Utterbagh	„ 24 „ „
Jhalokati, Sarupkati, Niamati, and Debhatta	„ 20 „ „

CANE—

Chalna	„ 1-8—Rs. 3 per hundred stems each 10—12 feet long.

WAX—

Dhasa and Khari	„ 50 per maund.
Diamond Harbour	„ 40 „
Khanjia, Nun-nagar, Basra ...	„ 35 „
Noabanki	„ 32 „
Jhalokati, Sarupkati, Niamati ...	„ 25 to Rs. 30 per maund.

HONEY—

Khanjia, Khari, Diamond Harbour ...	„ 6 per maund.
Jhalokati, Sarupkati, Niamati ...	„ 5 to Rs 6 per maund.
Kalaroa, Nun-nagar, Basra, and Dhasa ..	„ 5 per maund.

Miscellaneous Facts.

The Forest Staff.

50. The Forest Staff comprises the following sanctioned establishment :—

Gazetted Establishment.

	Monthly pay. Rs.
Deputy Conservator of Forests in charge of the Division ...	550
Extra Assistant Conservator of Forests, 3rd grade ...	250
Ditto ditto, 4th „ ...	200
Total ..	1,000

	Monthly pay Rs.
Forest Establishment.	
2 Rangers at Rs 60 each	120
6 „ „ 50 „	300
9 Foresters „ 40 „	360
5 „ „ 30 „	150
7 „ „ 25 „	175
11 „ „ 20 „	220
3 „ „ 15 „	45
21 Forest Guards at Rs. 8 each	168
Total ...	1,533
Office Establishment.	
1 Head-clerk	80
1 Second „	50
1 Third „	20
1 Fourth „	20
2 Peons at Rs. 7 each	14
2 „ „ 6 „	12
1 Sweeper	3
Total ...	199
Steamer Establishment.	
2 Engineers at Rs. 150 each	300
1 Engineer	125
3 Serangs at Rs. 30 each	90
3 Serangs „ 20 „	60
3 „ „ 16 „	48
15 Lascars „ 10 „	150
3 Stoker-tindals at Rs. 20 each	60
6 Stokers „ 16 „	96
3 Cooks „ 12 „	36
3 Sweepers „ 10 „	30
Total ...	995
Boat Establishment.	
9 Manjhis at Rs. 10 each	90
22 „ „ 8 „	176
32 Boatmen „ 8 „	256
83 „ „ 7 „	581
2 Forests Guards at Rs. 8 each	16
Total ...	1,119
GRAND TOTAL ...	4,851 per mensem.

Labour supply

51. The wood-cutters who resort to the Sunderban Government Forests for the purpose of extracting timber and other forest produce may be divided into two classes, namely, (1) professional wood cutters, who proceed to the forests at all seasons of the year, and (2) agriculturists, who are only free for outside work, unconnected with their fields, during the months of October, November, February, March, and April, or during abnormally dry or wet seasons when agricultural operations are impracticable, or when the rice harvest is delayed.

The rates asked by wood-cutters for daily labour in any portion of the Sunderbans north of the Government Forests vary according to the locality, but average one-half the rates asked for daily labour within the forests. The latter are—

(*i*) *during the dry months of the year*—

baolis	Rs.	0-6-6	each per day.
fakirs	„	0-7-0	„ „
shikaris	„	0-8-6	„ „

(*ii*) *during the monsoon*—

baolis	Rs.	0-7-6	each per day.
fakirs	„	0-8-0	„ „
shikaris	„	0-9-6	„ „

PART II.

Future management discussed and prescribed.

Basis of Proposals.

1. It is proposed to divide the area of the Sunderban Forests into four Working Circles, as follow :—

Working Circles.

(*i*)	The Bagirhat Working Circle; area	698	square miles.
(*ii*)	The Khulna "	846	"
(*iii*)	The Satkhira "	548	"
(*iv*)	The Protected Forest "	2,260	"
	Total "	4,352	"

These areas include the water-channels, which are of very considerable extent,* and the three first-mentioned circles correspond to the three ranges of the Sunderban Reserved Forests as given in annual Form No. 46, with this difference that the areas having been now (for the first time apparently) correctly calculated, the figures given in this report do not agree with those hitherto supposed to represent the area of the Sunderban Forests.

	Square miles.
In Bagirhat ..	132
„ Khulna ...	240
„ Satkhira ..	161
„ Protected Forests	642
Total ...	1,175

2. The Bagirhat and Khulna working circles comprise most of the sundri-producing area, and the division of the latter into two circles, as here proposed, is, apart from administrative reasons, dictated by the state of the sundri market, which may be said to be equally divided between the two districts of Khulna and Backergunge.

3. The Satkhira and Protected Forest areas, on the other hand, naturally divide themselves into two working circles; the former being reserved forest which, owing to the dearth of valuable timber contained in it, and let it be assumed the sufficiency of the Bagirhat and Khulna circles for the supply of the more important material, it is not considered necessary to place, for the present at least, under additional restrictions; while the last-named circle, as its name implies, occupies an altogether different legal status from any of the other proposed working circles.

4. The Bagirhat and Khulna working circles have been divided into a number of annual "coupes," corresponding to the number of years in the rotation. No other subdivision of the working circles has been attempted.

Subdivisions of the Working Circles.

A detailed examination of the crop has not been practicable in the time devoted to the preparation of the plan, nor could such an examination have been effected in a reasonable interval.

The selection of the "coupes" themselves, with regard to the order of their exploitation, could be based on such observations only as were practicable in the course of the brief valuation surveys executed, and of those visits that had to be made for procuring stump sections of the more valuable species. In this particular, however, something additional was learnt from the circumstance that the timber operations of the purchasers are at the present day located in the middle portions of the Bagirhat and Khulna ranges; and it is this area which undoubtedly possesses for the moment the largest quantity of marketable sundri timber, the tracts further north having been over-worked in this respect and those further south not containing the same large proportion of this material.

5. A number of valuation surveys were made in the north, centre, and south of the Bagirhat and Khulna ranges with the object of ascertaining the proportion of the more valuable species and the ratio of mature to immature trees.

Analysis of the crop.

A length of 25 feet, leading in each case in the direction of the heart of the island, was first traced on either side of a base line of 30 feet at the water's edge, and the stems contained within this area of 750 square feet were counted and classed according to their girth at four feet from the ground; this process being repeated on every 25-feet section of the linear survey thus commenced. Stems of less than nine inches in girth were not taken into account.

6. Except in the case of recent formations, and near the sea-coast where gorán predominates, the islands are all bordered by a distinct zone of charac-

teristic growth, in which golpatta, hantal, the rhizophors, keora, ora, kumra, &c., &c., predominate. This zone varies in width from 50 to 400 feet.

7. Occasionally the river frontage presents for a considerable distance the aspect of nearly pure keora forest, as on the left bank of the Pussur river (lot 240), the right bank of the Marabbola khál, the right bank of the Bangárah river, &c. This keora exercises a marked effect in arresting denudation and inducing the deposit of alluvial mud by means of its long lateral roots that throw up blind root-suckers to a distance of 150 feet or more from the parent tree. On the shelving mud banks thus formed seeds of all species are deposited by the tides and, taking root, grow rapidly.

8. It is in the interior of the islands behind this belt of riparian vegetation that the súndri forest most generally occurs either pure or, as is commonly the case, in association, more or less great, with gengwá, gorán, shingar, báen, bhádala, and other inferior species.

9. The detail of the valuation surveys is given in Appendix D.

10. The number of súndri trees of 3 feet in girth and over per acre of forest-clad area in the Bagirhat and Khulna circles was found to be about 4, and more than one-half of these were unmarketable for timber purposes by reason of unsoundness or defective growth. It is improbable, in fact, that a larger average number than 1·75 sound marketable sundri trees of 3 feet in girth or over will be found to the acre of forest in the Cagichat and Khulna working circles. Deducting 24·1 per cent. of these two circles as the area occupied by water and 26·5 per cent. as the area occupied by riparian or other inferior vegetation, we cannot claim to possess more than 487,680 acres under what may be called súndri forest; and from this we deduce a súndri crop (suitable for timber) of 3 feet in girth and over, amounting to 353,440 trees.

11. After súndri the principal species found in the Bagirhat and Khulna working circles are pussur, ámár, keorá, gengwá, and gorán, and then come báen, orá, kánkra, goriá, gáb, dhún lol, kirpá, shingar, golpatta, hantál, &c., &c.

12. In the Satkhira and Protected Forest working circles, the súndri is uncommon and its growth not good, owing, it is supposed, to the too saline properties of the soil, which is more subject here than elsewhere to tidal influences. The forest crop is thin and mostly composed of gengwá, gorán, shingar, púncha, and a few other inferior species.

13. Taking all the species together, the stock is extraordinarily dense, comprising several thousands of stems to the acre. Excluding the stems under nine inches in girth, there are probably still left a thousand trees to the acre of forest, the ground being so densely packed with trees as to exclude, at least in the reserved areas, all herbaceous vegetation.

14. But the great bulk of this heavy crop of trees comprises nothing better than poles. Some of the species, such as gorán and gengwá, do not appear to attain in nature a larger size, while as regards súndri it is evident, from observations made on the spot, that the mature, sound, straight trees have, in the case of the Bagirhat and Khulna circles, all been cut out, and that the demand for timber of this species has been reduced to supply itself from the young and half developed material.

15. Súndri, pussur, amúr and keora, constituting the most useful timbers found in the Sunderban forests, and the former being alone either relatively abundant or very valuable, it does not seem necessary to pursue this analysis of the crop further. More detailed information can, however, be obtained from Part I and from Appendix E.

Method of Treatment.

Bagirhat and Khulna Working Circles.

Object sought to be attained.

16. The object sought to be attained is to provide for a regular and uninterrupted supply of sound mature timber of the more valuable species, and it is considered that it will be sufficient for this purpose to subordinate the felling of these species (over a part of the Sunderban forests only, namely, the Bagirhat and Khulna ranges) to such light restrictions as attach to a system of area rotation and a minimum limit of girth.

17. It is not intended to interfere in any way with the removal of other species than súndri, pussur, amúr, and keora from any part of the Sunderban Forests, while arrangements may be made at any time for permitting the

removal of suppressed or unpromising trees of even the reserved kinds named above when these have been marked departmentally for the purpose.

Method of treatment.

18. The method of treatment proposed may thus be defined as improvement fellings combined with the extraction of trees of the better kinds where the latter have attained to certain exploitable dimensions, thus fulfilling the double object of improving the character of the forest and gradually increasing the mature stock available for the market both as regards their number and size.

The exploitable age, and the rotation proposed.

19. It has been found that although súndri cannot properly be pronounced mature when under five feet in girth, to which size it can, it is believed, in general attain without deterioration, yet unrestricted fellings in the past have so denuded the forests of even moderately-sized súndri trees that we cannot now arrange to bring these forests back to a normal condition of productiveness and at the same time continue to supply the market in the interval with a reasonable quantity of the timber which it must have without contenting ourselves at the outset with restrictions of a relatively light nature, having for their object not to restore the forests in the briefest time, but to extend that restoration over several rotations.

In the present plan we consequently propose to restrict the fellings by purchasers of *unmarked* súndri, pussur, amúr, and keora trees in the Bagirhat and Khulna working circles to stems of over 3 feet in girth (breast high), and this on a rotation of 10 years only; the intention being to increase the minimum limit at which the sundri trees may be felled after every successive rotation of 10 years, and this to the extent which future experience and a larger knowledge of the species and its rate of growth may render practicable.

20. The ring-countings of súndri stump-sections given in Appendix C of this report show, after eliminating all sections pointing to an exceptionally slow rate of increase, that if we are to accept these rings as true indices of súndri growth, the latter must be relatively very slow under the existing conditions of the Sunderban Forests, indicating, as these rings do, a growth of not more than 1 foot of girth to a period of 20 years, or 5 feet to a period of 100 years.

On the other hand, it is difficult to believe that any tree coming up in the forcing climate and exceptionally fertile soil of the Sunderban delta should be so slow of growth, and the traditions of the local wood-cutters on the subject are entirely opposed to such a conclusion.

It may, however, be the case that the trees are too densely packed in the Sunderban forests to be able to develop rapidly in girth, or that in the muddy water-logged soil of these localities the deficiency of atmospheric air is a more serious hindrance to rapid growth than is generally supposed, and possibly both conditions may combine to retard tree growth.

21. Under existing circumstances it is not imperative for the purposes of this plan to have correct information on the subject, as the first rotation must in any case be made to depend on factors with which the rate of súndri growth has nothing to do, unless, indeed, that growth could be demonstrated to be preternaturally fast, which seems hardly probable.

These factors have already been referred to, and are our inability to close more than $\frac{2}{10}$ths of the súndri-producing area each year, and the present impracticability of extending the limits below which súndri trees may not be removed by the purchasers beyond a minimum of three feet girth (breast high).

22. It is proposed to at once select sample plots containing healthy súndri trees of different sizes growing under apparently normal conditions and to take exact measurements of these trees once a year, with the view to ascertaining in the course of the next 10 years, if not the correct rate of súndri growth, at least something more definite on the subject. It is a matter for regret that this was not thought of years ago.

The Fellings.

Satkaira and Protected Forest Working Circles.

23. These two circles do not contain an important quantity of timber belonging to the valuable species, nor are local conditions of a kind to lend hope that these forests may, with care on our part, improve in this particular.

It is consequently not proposed to place any new restrictions on the removal by purchasers of forest produce from these extensive areas.

Purchasers will be permitted as heretofore to remove any forest produce from these two working circles on payment of the prescribed fees.

Bagirhat and Khulna Working Circles.

Arrangement of the "coupes" in the Bagirhat and Khulna Working Circles.

24. The arrangement of the annual "coupes" in the Bagirhat and Khulna Working Circles during the 10 years of the first rotation has been shown on the maps of the above two working circles, drawn on a scale of 2 miles to the inch, which accompany this report, and is again indicated in the following statement, which gives the *land* area of each coupe in acres side by side with the year of its proposed exploitation.

From remarks that have gone before it will be gathered that the serial order in which the "coupes" are arranged has been regulated by the relative degree of preparedness of each locality for fellings.

The coast regions contain but little sundri timber, hence the large size of the "coupes" in that direction.

BAGIRHAT WORKING CIRCLE.

No. of Coupe.	Year of exploitation.	Area.	
		Acres.	
I	1893-94	36,665	
II	1894-95	33,907	
III	1895-96	31,981	
IV	1896-97	35,533	
V	1897-98	30,816	
VI	1898-99	39,175	
VII	1899-1900	56,467	
VIII	1900-01	32,582	
IX	1901-02	34,349	
X	1902-03	30,765	
		362,240*	* 566 square miles.

KHULNA WORKING CIRCLE.

No. of Coupe.	Year of exploitation.	Area.	
		Acres.	
I	1893-94	52,134	
II	1894-95	32,582	
III	1895-96	33,606	
IV	1896-97	30,656	
V	1897-98	53,075	
VI	1898-99	55,866	
VII	1899-1900	53,421	
VIII	1900-01	30,029	
IX	1901-02	32,141	
X	1902-03	34,330	
		387,840*	* 606 square miles.

Supplementary Regulations.

Sylvicultural operations, &c.

25. It is not proposed to *prescribe* during the first rotation any sylvicultural operations other than the foregoing.

Judicious thinnings would doubtless greatly benefit the sundri-producing areas, and it should be the duty of the Conservator to see that such works are undertaken to the greatest extent practicable, but having regard to the limited demand for firewood as compared with the enormous quantity of material available and the difficulty of loading the boats profitably with crooked billets of any kind, it is felt that it would be unwise to make any definite prescriptions in this particular.

The natural reproduction of all the species leaves nothing to be desired, and no assistance is called for in this direction.

The forests are everywhere opened out by magnificent rivers which are connected with one another by numerous minor channels, so that nothing further is needed under the head of communications.

Creepers inflict no serious injuries on the trees, and the peculiar circumstances of the forests render them self-protecting in the matter of fires and cattle.

With the exception of a few artificial lines of small importance, the entire boundary of the Sunderban forests is a water boundary, and there are consequently no provisions necessary in connection with this class of works.

Miscellaneous.

Forecast of outturn.

26. The average outturn of material from the Sunderban Government Forests during the past four years has been as follows:—

For the purpose of this calculation the following factors of conversion have been made use of throughout:—
1 maund of timber = 1¾ c. ft.
1 „ of fire-wood = 1¼ „

	C. ft.
Timber	81,55,769
Firewood	1,10,54,167
	Rs.
Other produce	60,832

The forecast under the provisions of the present plan is—

	C ft.
Timber	11,24,000
Firewood	1,12,00,000
	Rs.
Other produce	70,000

Forecast of revenue and expenditure.

27. The following tabular statement compares the average receipts and expenditure of the past four years with the anticipated financial results under the provisions of the present working plan:—

Revenue.

Budget heads.	Average revenue from 1888-89 to 1891-92.	Anticipated average revenue under the provisions of this working plan.	Remarks.
	Rs. A. P.	Rs. A. P.	
I.—Timber and other produce removed from the forests by Government agency—			
a.—Timber	.....	.....	
b.—Firewood and charcoal	.....	.....	
c.—Bamboos	.....	.....	
d.—Sandal-wood	.....	.....	
e.—Grass and other minor produce ...	.....	.....	
II.—Timber and other produce removed from the forests by consumers or purchasers—			
a.—Timber	2,36 411 14 8*	1,24,000 0 0	* Including revenue from leased lots, *vide* Appendix A.
b.—Firewood and charcoal	1,32,871 4 0*	2,00,000 0 0	
c.—Bamboos	.....	.....	
d.—Grazing and fodder grass	.....	.....	
e.—Other minor produce	67,192 5 3*	70,000 0 0	
III.—Drift and waif wood and confiscated forest produce	516 0 9	200 0 0	
IV.—Revenue from forests not managed by Government—			
a.—Duty on foreign timber and other forest produce	.....	... ..	
b.—Revenue from shared and private forests	.....	.....	
V.—Miscellaneous—			
a—Fines and forfeitures	10 11 2	10 0 0	
b—Refunds	70 1 10	70 0 0	
c.—Other sources	10,668 15 1	10,720 0 0	
Total Revenue ...	4,48,541 4 9	4,05,000 0 0	

Expenditure.

Budget heads.	Average revenue from 1888-89 to 1891-92.	Anticipated average expenditure under the provisions of this working plan.	Remarks.
A.—Conservancy and Works—	Rs. A. P.	Rs. A. P.	
I.—Timber and other produce removed from the forest by Government agency—			
a.—Timber	11 4 0	... .	
b.—Firewood and charcoal	.....	.....	
c.—Bamboos	.....	.....	
d.—Sandal-wood	.....	.. ...	
e.—Grass and other minor produce ..	.. ..	.. ...	
II.—Timber and other produce removed from the forests by consumers or purchasers	37,489 8 3	45,000 0 0	
III.—Drift and waif wood and confiscated forest produce	17 12 8	20 0 0	
IV.—Revenue from forests not managed by Government	. ..	... ..	
V.—Rent of leased forests, &c.	.. . .	.	
VI.—Live-stock, stores, tools and plant—			
a.—Purchase of cattle	.. ..	..	
b.—Feed and keep of cattle	... .	... ..	
c.—Purchase of stores, tools and plant ...	10,627 8 5	5,000 0 0	
VII.—Communications and buildings—			
a.—Roads and bridges	. ...	.....	
b.—Buildings	1,139 12 4	2,500 0 0	
c.—Other works	90 0 3	100 0 0	
VIII.—Demarcation, improvement, and extension of forests—			
a.—Demarcation	30 12 4	50 0 0	
b.—Compensation for land and rights ...	.....	.. ...	
c.—Surveys and working plans ..	70 5 11	200 0 0	
d.—Sowing and planting	... ..	.....	
e.—Protection from fire	.....	. ..	
f.—Other works	.....	.....	
IX.—Miscellaneous—			
a.—Refunds	97 9 6	100 0 0	
b.—Law charges	7 7 8	10 0 0	
c.—Other charges	1,980 15 5	2,020 0 0	
Total ...	51,563 0 9	55,000 0 0	
B.—Establishment—			
I.—Salaries—			
a.—Conservators	.. .	.....	
b.—Superior officers	14,099 5 11	12,000 0 0	
c.—Subordinate forest and depôt establishments	14,585 5 9	18,456 0 0	
d.—Office establishment	3,242 3 1	2,388 0 0	
e—Deputation and special allowances ...	223 11 5	360 0 0	
II.—Travelling allowances—			
a.—Conservators	.....	....	
b.—Superior officers	1,669 7 10	2,040 0 0	
c.—Subordinate forest and depôt establishments	177 3 3	200 0 0	
d.—Office establishments	225 5 0	200 0 0	
III.—Contingencies—			
a.—Stationery	10 6 6	10 0 0	
b.—Carriage of tents and records ...	134 9 10	100 0 0	
c.—Rents, rates and taxes	1,087 9 5	100 0 0	
d.—Pay of police guards	.....	...	
e.—Official postage	298 4 4	500 0 0	
f.—Sundries	552 1 8	546 0 0	
Total B ...	36,551 10 0	37,500 0 0	
Grand Total of Expenditure ...	88,114 10 9	92,500 0 0	
Surplus ...	3,60,426 10 0	3,13,500 0 0	

APPENDIX A.

NOTE ON THE SALE AND SETTLEMENT OF WASTE LANDS IN THE SUNDERBANS.

Mr. Blochmann remarks in Hunter's Statistical Account of Bengal, volume I, page 381:—"The detailed list of the mahals in Sarkars Satgáon and Khalíátábád, of Todar Mull's rent-roll, enables us positively to assert that in 1582 the northern outskirts of the Sunderbans, as far as it lies within the Presidency Division, corresponded almost exactly with the northern boundary of the jungle as shown on modern survey maps."

Relative position of forest land and cultivation almost unchanged for the last three hundred years

In 1772 a five years' settlement was made with the zamindars holding the lands on the north of the forest area. This was renewed from year to year, until 1790, when it was made decennial, and in 1793 permanent.

Zamindári settlement of land already in de-cultivation.

Towards the close of last century the forest portion of the Sunderbans was infested with dacoits, to oust whom, and open out the country, it was proposed by Mr. Tilman Henckell, Judge of Jessore, in a memorandum submitted to Warren Hastings and approved by Government (1783-84), to lease out the forest lands to raiyats, who should be holders under Government direct. The terms of the grants were very liberal. Mr. Rooke, who succeeded Mr. Henckell, reported in 1790 that the scheme had failed, not, however, from inherent defects so much as from want of data as to what really comprised Sunderban forest lands. Surveys had accordingly to be undertaken, and are here given in their chronological order. Rennel's map of the surveys made in 1764 to 1772 did not give sufficient data, and in fact the southern limit of the zamindaris was not properly defined until 1838.

Raiyatwári settlement of forest land first attempted, 1784.

Surveys of the Sunderbans.

1. Captain Robertson's (1810).—Main water routes from the Hooghly to the Bámini river in Noakháli.

2 Lieutenant Morrieson's (1811—14).—Main water channels from the Hooghly to the Pussur river. This was checked by Captain Hugh Morrieson in 1818. The northern boundary of the forest was not surveyed.

3. Lieutenant Blane's (1813-14).—Coast line from the Hooghly to the Thákúrán river.

4. Lieutenant Prinsep's (1821—23).—The line separating forest from cultivation, from Pránpur on the Jabúna river to a little below Calpe on the Hooghly.

5. Lieutenant Hodges' (1829).—The northern boundary of the forest from the Baliswar to the Jabúna river. His map on a scale of 1″ = 2 miles, as well as that of Lieutenant Prinsep, was published in 1831. He formed his own and Lieutenant Prinsep's allotments into one series bearing consecutive numbers 1 to 236.

6. Captain Lloyd's (1841).—The sea face.

7 Captain Smyth's (1850).—A resurvey and demarcation of Lieutenant Prinsep's line.

8. Mr. Ellison (1873) compiled the latest map of the Sunderbans on a scale of 1″ = 4 miles from the above records, as well as from the revenue surveys of the 24-Parganas (1851—55), Jessore (1855—59), and Backergunge (1860—63).

All the water channels are not shown on this map, and some have altered their course since 1873.

Regulation XXIII of 1817 was passed to define the right of Government to all lands reclaimed since the passing of the permanent settlement and to lands within the patitábádi and jangalburi taluks of the 24-Parganas and Jessore. At that time the Jessore district included Khulna, which was not made a separate district until 1882.

Lands reclaimed from 1793 to 1817.

For the purpose of carrying out the provisions of the above Regulation, the survey and measurements of lands were essential preliminaries; but this took time, and the landholders proving obstructive, new measures had to be concerted.

Soon after Lieutenant Prinsep's survey, Regulation IX of 1825 extended the provisions of Regulation VII of 1822 to the Sunderbans and to estates bordering thereon, and to all lands not included within the limits of the permanently-settled estates. The provisions of this Regulation were found to be inoperative as regards the forest tracts of the Sunderbans. Hence Regulation III of 1828 was enacted, appointing a special Commission for determining the investigations made under Regulations II of 1819 and IX of 1825, and for summarily deciding claims to lands. By this Regulation the right of the State to the forest lands of the Sunderbans was definitely asserted. Under section 13 of Regulation III of 1828 the forest tracts in the Sunderbans became available for grants. Revised rules for the grant of such tracts were published in March 1830, and numerous applications were made, chiefly by Europeans resident in Calcutta. The regular reclamation of the Sunderbans may be said to have commenced from this year.

The right of the State to the forest lands of the Sunderbans definitely asserted, 1828.

A Government Resolution No. 1303, dated the 24th September 1853, published in the *Calcutta Gazette* of the 8th October of that year, approved certain revised rules for the grant of all lands in the Sunderbans. As some existing grants were thereby confirmated,

Revised rules for the grant of lands in the Sunderbans, 1853.

others forfeited and re-granted, and a large number newly conferred, a great majority of the grants are now governed by these rules.

In 1858 two measures of revenue policy were brought forward by Government, viz., (1) for the sale of waste lands in perpetuity without prospective demand for land revenue, and (2) for the redemption by purchasers of the existing land revenue on lots already leased, which thereafter accordingly became holdings in "fee simple."

Sale of waste lands and redemption of revenue, 1858.

The adjudication of claims to waste lands was provided for by Act XXIII of 1863.

The question of the general reclamation of the Sunderbans by private enterprise was put to the test in 1863 to 1868. The *bankar*, or exclusive right to the forest produce, was leased under certain reservations at an upset price of Rs. 2-8 per acre, under suggestions made in 1863 by the Revenue Commissioner and approved by the Board of Revenue in 1864.

Project for the reclamation of the Sunderbans by private enterprise, 1863—68.

In January 1865 Mr. F. Schiller and eight other gentlemen, European and native, applied to Government to purchase all the ungranted waste lands in the Sunderbans, proposing to raise a capital of not less than one million sterling, and to clear the land by imported labour. These terms were approved by the Government of India, but Mr. Schiller was unable to raise the necessary capital, and the scheme fell through.

The Port Canning Company bought most of the bankar leases put up to auction in 1866, and by purchasing the rest in 1867 acquired a monopoly of the forest produce. Their rates were—

	Rs.	A.		
Timber of all kinds	8	0	per hundred maunds.	
Firewood	2	0	,,	,,
Thatching material	0	12	,,	,,
Shells for lime	4	0	,,	,,

The lease of the bankar was, after sixth months' notice, resumed by Government in February 1869, on the ground that the monopoly was contrary to the interests of the general public, and that oppression was exercised by the Company in the collection of their fees. This action was upheld on appeal to the Government of India.

Full information on the subject of the settlement of the Sunderbans may be obtained from Mr. Pargiter's "Revenue History of the Sunderbans from 1765 to 1870," published at the Bengal Secretariat Press in 1885.

The most recent rules for the lease of waste lands in the Sunderbans to large and small capitalists were published by the Bengal Government in *Calcutta Gazette* notification of the 12th November 1879. They are embodied in section II of the Rules for the lease of Waste Lands in Bengal published in a collected form in May 1880. Their chief feature, as affecting the Forest Department, is that full royalty must be paid on forest produce exported for sale from lots leased under their provisions.

Waste Land Rules of the 12th November 1879.

The lands situated on the north of the Government forests accordingly come under four heads—(1) lands held under the permanent settlement; (2) lands held in fee simple; (3) lots leased under the rules of the 24th September 1853; and (4) lots leased under the rules of the 12th November 1879.

The office of Commissioner in the Sunderbans was created by Regulation IX of 1816. His authority was extended in 1819, so as to enable him to grant leases of all available forest lands. The Collectors of the 24-Parganas and Khulna exercise revenue jurisdiction concurrently with this officer. The revenue of all Sunderbans estates is paid into the treasuries of the above-named districts in whichever they are situated, but all other revenue work is performed by the Sunderbans Commissioner, who also grants, with the sanction of Government, leases of available forest land, undertakes inspections, surveys, &c.

The "Commissioner in the Sunderbans."

Lots leased under the rules of the 12th November 1879.

No.	Portion in acres.	Date of Government Notification.	Date of grant of lease.
36	1,016	31st August 1881	1st April 1882.
36	997	Ditto	Ditto.
67	1,260	2nd November 1881	Ditto.
11*	1,100	20th January 1882	Ditto.
11*	1,383	Ditto	Ditto.
87	716	18th February 1882	Ditto.
90	2,246	Ditto	Ditto.
163	1,322	11th April 1882	Ditto.
11*	1,239	25th May 1883	Ditto.
16*	1,411	15th February 1884	1st April 1883.
115	1,653	B. G. No. $\frac{1525}{410}$ L.R., dated 8th May 1882	1st April 1884. Ditto.

*Excluded from Protected Forest.

No.	Portion in acres	Date of Government Notification.	Date of grant of lease.
110*	1,488	14th February 1886	1st April 1886.
216*	1,240	15th April 1886	Ditto.
216*	942	Ditto	Ditto.
138*	1,653	16th April 1887	1st April 1887.
138*	1,653	18th April 1887	Ditto.
118*	1,653	12th February 1888	12th April 1888.
116*	1,653	Ditto	Ditto.
110*	1,653	Ditto	Ditto.
122*	1 157	Ditto	Ditto.
122*	1,157	Ditto	Ditto.
135*	1,488	29th April 1889	13th April 1889.
128*	363	Ditto	Ditto.
228*	1,322	6th March 1890	13th April 1890.
223*	1,388	Ditto	Ditto.
223*	1,983	Ditto	Ditto.
223*	1,388	Ditto	Ditto.
135*	1,322	Ditto	Ditto.
111*	1,653	Ditto	Ditto.
111*	1,653	1st April 1891	13th April 1891.
240†	1,653	Ditto	Ditto.
240†	1,653	Ditto	Ditto.
240†	1,587	Ditto	Ditto.
225*	1,653	Ditto	Ditto.
225*	1,653	Ditto	Ditto.
225*	1,653	Ditto	Ditto.
111*	3,338	Ditto	Ditto.
216*	411	Leased under Rule 5, Section II, Part II	13th April 1889.
216*	173	Ditto ditto ...	Ditto.
216*	236	Ditto ditto ...	Ditto.
216*	661	Leased under Rule 3, Section II, Part II	12th April 1888.
216*	661	Ditto ditto ...	13th April 1889.
216*	727	Ditto ditto ...	Ditto.
224*	1,322	Ditto ditto ...	Ditto.
224*	925	Ditto ditto ...	Ditto.
224*	330	Ditto ditto ...	13th April 1890.
224*	397	Ditto ditto ...	Ditto.
224*	397	Ditto ditto ...	Ditto.

* Excluded from Protected Forest.
† Ditto from Reserved Forest.

APPENDIX B.

LIST OF THE TREES, SHRUBS, AND CLIMBERS OF THE SUNDERBAN GOVERNMENT FORESTS.

Systematic name.	Local names, distribution, and uses.
Tamariscineæ.	
Tamarix gallica, *Linn.* ...	NUNA-GACH.—Common in all the forests near river banks and on recent clearings for cultivation. Height 20 feet. Cut for firewood.
Malvaceæ.	
Hibiscus tiliaceus, *Linn.* ...	BHOLA, CHELWA.—AN ubiquitous climber, injurious to forest growth The liber furnishes the wood-cutters with a strong fibre for cordage.
Thespesia populnea, *Corr.* ...	DUMBLA.—Found chiefly west of the Raimangal river. Height 30 feet. Wood hard, durable; used for furniture. The liber yields a fibre, and the capsules a yellow dye.
Sterculiaceæ.	
Heritiera Fomes, *Buch.* ...	SUNDRI.—The principal species of the Sunderbans. Occurs chiefly as a timber tree east of the Raimangal river. Height 40—50 feet. Weight 65 lbs. per cubic foot. Wood dark red, durable, tough. Used extensively in boat-building; also for rafters, posts, planks, furniture, and firewood, and for jhools and dabbas of boats The tree buttresses freely and sends up blind root-suckers, but does not coppice well. The wood withstands moisture and attacks of borers, but not of the marine worm. The charcoal is used by gold and silver smiths.

Systematic name.	Local names, distribution, and uses.
Sterculiaceæ—concld.	
H littoralis, *Dryand* ...	SUNDRI.—A species associated with and applied to the same uses as the foregoing, but very rare.
Tiliaceæ.	
Brownlowia lanceolata, *Roxb.*	KEDAR-SUNDRI.—A tree of the reserved forests, associated with and much resembling sundri. Cut for firewood.
Rutaceæ.	
Paramignya longispina *Hook. f.*	BAN-NEBU.—A thorny under-shrub of the reserved forests. The fruit is used in cases of colic
Meliaceæ.	
Carapa moluccensis, *Lam.* ...	1. PUSSUR.—A tree of the reserved forests east of the Arracangasia river, found in swampy localities. Height 60 feet Weight 45 lbs. per cubic foot. Wood white, turning red on exposure, hard; used for tool-handles, hand-spikes, axles, spokes of wheels, house-posts, planking, &c. It withstands moisture. The tree sends up blind root-suckers. It exudes a clear, brown, brittle resin. The fruit, which is the size of an orange, yields an illuminating and lubricating oil 2. DHUNDOL, (GAMUR, KARAMBHOLA (*C. obovata*, Blume).—The same species as the foregoing, with which it is associated, but with certain differences that may here be noted. Height 40 feet. Wood reddish-brown, and put to the same uses as that or pussur. The tree does *not* send up blind root-suckers. The fruit, which is the size of a shaddock, is used in tanning.
Amoora cucullata, *Roxb* ...	AMOOR, LATMI, NATMI.—Timber tree. found chiefly in the reserved forests, in low-lying swampy localities, near water-channels, associated with pussur. Height 30—40 feet. Weight 44 lbs. per cubic foot. Wood red or brown, hard, but apt to split; used for posts and firewood. The leaves when bruised are applied to inflamed sores. The tree sends up blind root-suckers.
Celastrineæ.	
Salacia prinoides, *DC.* ...	DUMAL, MOLKUPHAL.—A small tree of the reserved forests. Height 20 feet, with a straggling habit. Used only for firewood.
Sapindaceæ.	
Sapindus Danura, *Voight* ...	NUNCHA.—An evergreen shrub. Cut for firewood.
Ampelideæ	
Vitis lanata, *Roxb.* ...	GOELE-LOTA.—A common climber used by the wood-cutters for twisting into ropes.
Anacardiaceæ.	
Bouea burmanica, *Griff.* ...	MIRIAM, URIAM.—A timber tree of the reserved forests. Height 50 feet. Weight 55 lbs. per cubic foot. Used for constructing parts of boats above the water-line. The fruit is edible.
Leguminosæ.	
Derris scandens. *Benth.* ...	NOA-LOTA.—A common climber near river banks.
D. uliginosa, *Benth.* ...	KEHA-LOTA.—A large evergreen scandent shrub, found in all the forests. The stems are twisted into ropes for tying logs to boats
D sinuata, *Thwaites*	SUNDE-LOTA, MAHAJANI-LOTA.—Also a common climber, found on river banks, and used for same purposes as the foregoing.

Systematic name.	Local names, distribution, and uses.
Leguminosæ—concld.	
Pongamia glabra, *Vent* ...	KERRAN, KARANJA, DALKARAMCHA, PITAGORIA.—A tree found throughout the reserved forests from cultivation to the sea-borde Height 45 feet. Weight 42 lbs. per cubic foot. Wood white, turning yellow on exposure, hard, but liable to be attacked by insects, and hence used only for firewood. The seeds yield an oil used in burning, and in native medicine for skin diseases.
Dalbergia spinosa, *Roxb.* ...	AMANTA.—A very thorny shrub found in the reserved forests, near the sea face, and on river banks
D. monosperma, *Dals.* ...	PANCHIOLI.—A scandent shrub cut for firewood.
Cynometra ramiflora, *Linn.* ...	SHINGRA, SHINGAR.—A tree, abundant in all parts of the reserved forests. Height 20 feet. Weight 56 lbs per cubic foot. Wood red, hard; used in the construction of carts, and for posts and firewood. Sundri seedlings do not thrive in the shade of this species, the canopy of which is spreading, and the foliage dense.
Cæsalpinia nuga, *Ait.* ...	NATUA, NETU, SHINGRI-LOTA.—A very common prickly scandent shrub, of no economic value.
Cæs Bonducella, *Fleming* ...	NATA.—A large thorny climber found on the outskirts of forests along the sea face, along river banks, and on clearings for cultivation. The seeds, ground down and mixed with pepper, are taken in cases of fever.
Afzelia bijuga, *A. Gray* ...	BHIALA, BHAILA, BHADALA, SHUNDAL, PINGEH.—A tree common in the reserved forests. Height 30 feet. Weight 50 lbs. per cubic foot. Wood reddish-brown, hard; used for beams and girders of bridges, house-posts, and firewood. Coppices freely.
Cassia Fistula, *Linn.* ...	SHONGRAL.—A tree of the reserved forests. Height 50 feet. Weight 57 lbs per cubic foot. Wood red, hard; used for posts, rice pounders, &c. The bark is used in dyeing and tanning.
Entada scandens, *Benth.* ...	GILA.—A common large climber. The seeds are roasted and eaten.
Combretaceæ.	
Lumnitzera racemosa, *Willd.*	KIRPA.—A tree growing in the forests along the sea face and on river banks. Height 40 feet. Wood hard, durable; used for rafters, posts, and firewood: stands moisture; makes a good charcoal.
Myrtaceæ.	
Barringtonia racemosa, *Blume.*	KUMIA.—A tree found usually near river banks associated with B. acutangula, *Gærtn.*, and B speciosa, *Forst.*, also called KUMIA. Height 50 feet. Wood white, soft; used only for firewood. The outer pulp of the fruit is eaten by deer.
Eugenia fruticosa, *Roxb.* ...	BAN-JAM.—A large shrub or small tree, not common. Cut for firewood.
Rhizophoreæ.	
Ceriops Candolleana, *Arn.* ...	GORAN, GUTTIA.—A tree forming the principal species of the Government forests west of the Arpangassia river, and of the southern portion of the reserved forests. Height 12—20 feet. Wood brick-red, hard; used for house-posts and firewood; makes the best charcoal. The bark gives a red dye, and is used in tanning.

Systematic name.	Local names, distribution, and uses.
Rhizophoreæ—concld.	
(1 Roxburghiana, *Arn.* ...	GORAN.—A tree associated with the above and applied to the same uses. Height 20–35 feet. Weight 63 lbs. per cubic foot.
Kandelia Rheedii, *W. & A.* ..	GORIA.—A tree found in the coast forests, and on the banks of tidal rivers. Height 20 feet. Wood soft; used for charcoal. The bark is used in dyeing.
Bruguiera gymnorhiza, *Lam.*	KANKRA.—This species is associated with the above on the banks of brackish rivers. Height 40 feet. Weight 54 lbs. per cubic foot. Wood red-brown, hard; used for beams, posts, planks and firewood, and for jhools and dabbas of boats. The bark is used in tanning.
Rhizophora mucronata, *Lam.*	BHARA.—The mangrove. Found in the coast forests. Height 25 feet. Weight 70 lbs. per cubic foot. Wood red, hard, but splits in seasoning. Used only for firewood. Fruit edible. The bark is used in tanning.
Lythraceæ.	
Sonneratia apetala, *Linn.* ...	KEORA.—A tree, gregarious on banks of brackish rivers, chiefly in the forests east of the Raimangal river. Height 50 feet. Weight 44 lbs. per cubic foot. Wood reddish-brown, hard; used for in-door planks, furniture, boxes, firewood and charcoal, and for jhools and dabbas of boats. The tree sends up blind root-suckers.
S. acida, *Linn. f.* ...	ORA, ORCHA.—Associated with the above, but found chiefly in the northern parts of the reserved forests. Height 30 feet. Weight 31 lbs. per cubic foot. Wood grey, soft; used only for firewood. The fruit is eaten. The tree sends up blind root-suckers.
Ficoideæ.	
Sesuvium Portulacastrum, *L.*	An extensively creeping plant of the seashore. It roots in and serves to bind the sand. Other sea-shore plants of the Sunderbans that also serve this useful purpose are Pluchea indica, *Less.*, Wedelia biflora, *DC.*, Ipomœa biloba, *Forsk.*, Suæda maritima, *Dumort.*, Canavalia obtusifolia, *DC.*, and Aristolochia indica, *Willd.*
Rubiaceæ	
Petunga Roxburghii, *DC.* ...	JULIR, NARKELI.—A small tree. Height 15 feet. Wood white, hard; used for making boxes and native furniture.
Morinda citrifolia, *Linn.* ...	BARA-CHAND.—A small tree cut for firewood.
Myrsineæ.	
Ægiceras majus, *Gærtn.* ...	KOILSHA, KHALSHI, KULSI.—A tree found chiefly in the reserved forests along river banks near the sea face. Height 20 feet. Weight 40 lbs. per cubic foot. Wood hard, but used only for firewood.
Plumbagineæ.	
Ægialitis rotundifolia, *Roxb.*	A shrub or small tree found in the coast forests associated with the rhizophors.
Ebenaceæ.	
Diospyros embryopteris, *Pers.*	GAB, MAKLERANDI.—An evergreen tree found in the reserved forests, but not common. Height 60 feet. Weight 53 lbs. per cubic foot. Wood white, hard; used in building, for masts and yards, and for firewood. The viscid pulp of the fruit is used to pay the seams of boats, and to strengthen nets and cordage. It is full of tannin, and is used in native medicine as an astringent. The fruit is eaten.
Apocynaceæ	
Cerbera Odollam, *Gærtn.* ...	DAKUR, DAPUR, DAKO.—A fairly common tree in all the forests on river banks. Height 40 feet. Wood white, soft; useless. The seeds yield a lamp oil.

Systematic name.	Local names, distribution, and uses.
Asclepiadeæ.	
Sarcolobus globosus, *Wall.* ...	BAOLI-LOTA.—A common climber. The kernel of the ripe fruit is eaten.
Hoya parasitica, *Wall.* ...	PARGATCHA.—Extremely common on the trees of the reserved forests.
Bignoniaceæ.	
Dolichandrone Rheedii, *Seem.*	GORSHINGIEH.—A tree of the reserved forests, right down to the coast. Height 50 feet. Weight 35 lbs. per cubic foot. Wood white, soft; used only for firewood.
Acanthaceæ.	
Acanthus ilicifolius, *Linn.* ...	HARGOSA, KÍNTKI.—A very common under-shrub on banks of brackish rivers, and in low swampy localities in the interior of the islands. Serves a useful purpose in binding the mud of river banks. Two other species were found on the banks of the western rivers of the protected forests, namely, A. ebracteatus, *Vahl.*, and A volubilis, *Wall.*
Verbenaceæ.	
Avicennia officinalis, *Linn.* ...	BAEN, BANI (*Av. tomentosa*, Roxb).—A large timber tree of the reserved forests. Height 40—60 feet. Weight 58 lbs. per cubic foot. Wood dark grey, hard; used for planking, beams, drain-pipes, sluices, oil-mills, firewood, and for jhools and dabbas of boats. Exudes a gum that is applied to ulcers. The tree sends out blind root-suckers.
Clerodendron inerme, *Gærtn.*	BUTRAJ, BHUNJAM.—An under-shrub occasionally found in the reserved forests, common on river banks in all the forests, and cut for firewood.
Cl. Siphonanthus, *Br.* ...	BAMANHATTI.—Associated with the foregoing and cut for firewood.
Loranthaceæ.	
Loranthus longiflorus, *Desr.*	FARALLA.—This, and other species of the same genus, are common parasites on sundri and other trees in the reserved forests.
Euphorbiaceæ.	
Excœcaria Agallocha, *Linn.*	GENGWA, GEO, GERIA.—A tree common in all parts of the Sunderbans; associated with gorán in the protected forests and along the coast, and with sundri in the reserved forests. Height 30—50 feet. Weight 26 lbs. per cubic foot. Wood white, soft; used chiefly for firewood, but also for jhools, dabbas, posts, planks, native drums, toys, for conversion into charcoal, and for the extraction of an oil. The sap of all parts of the tree is poisonous.
Sapium indicum, *Willd.* ...	BATUL (*Excœcaria indica*, Müll., Arg.).—A tree common in the reserved forests. Height 25 feet. Weight 29 lbs. per cubic foot. Wood light-brown, soft; used for firewood. The seeds are used by fishermen to poison water.
Cyclostemon subsessilis, *Kurz.*	BAN-BOKAL.—A tree of the reserved forests. Height 30 feet. Wood brown, hard; used for planking
Croton caudatus, *Geisel* ...	NUN-BHANTWI.—An erect or climbing shrub found on the banks of rivers in all the forests. Wood yellowish-white, hard; used for firewood.
Briedelia stipularis, *Blume* ..	HARINHARA—A large scandent evergreen shrub Wood brown, hard; used for firewood.
Urticaceæ.	
Ficus retusa, *Linn* ..	JIR, ZIR.—A tree of the reserved forests. Height 50 feet Wood useless except for fuel.

Systematic name.	Local names, distribution, and uses.
Juncaceæ.	
Flagellaria indica, *Willd.* ...	AH-BETI, BANCHANDA.—Common in clearings along the northern border of the forests. The reeds are made into native pens.
Palmæ.	
Phœnix paludosa, *Roxb.* ...	HANTAL, HITAL.—A common gregarious palm, found everywhere on or near the banks of tidal rivers. Height 12 feet. The stems are used for the frames of the walls of native houses, and for dunnage of roofs. The leaves are used in thatching. The fruit is eaten.
Nipa fruticans, *Wurmb.* ...	GOLPATTA.—A common soboliferous palm growing on the banks of the estuaries and tidal rivers of the reserved forests, and on swampy localities in the interior of the islands. The large grooved leaf stalks are used as floats for sundri logs. The young leaves are twisted into ropes for tying boats to banks; and the full-grown leaves are cut and exported for thatching purposes. The fruit when young is edible. Toddy is obtained from the spathe.
Calamus Rotang, *Roxb.* ...	SACHI-BET.—A cane found in the northern portions of the reserved forests. Used for making the seats and backs of chairs, baskets, &c.
C. longipes, *Griff.* ...	GOLA-BET.—Associated with the above and other (unidentified) species of the same genus and applied to the same purposes.
Pandaneæ.	
Pandanus fœtidus, *Roxb.* ...	KOTKI-KANTA.—A screw-pine found in the northern parts of the reserved forests; of no economic value.
P. odoratissimus, *Linn. f.* ...	KEWA-KANTA.—This species forms patches of dense impenetrable jungle in the central and southern portions of the reserved forests and in places in the protected forests. The flowers are eaten with pân, and used to sweeten the odour of castor oil.
Typhaceæ.	
Typha elephantina, *Roxb.* ...	HOGLA.—Abundant on river banks along the northern border of the reserved forests. The split reeds are woven into mats for the coverings of boats, sides of native houses, &c., and the leaves are used in thatching.
Gramineæ.	
Arundo karka, *Linn.* ...	NAL.—Found on clearings in and immediately north of the reserved forests. *Dharma* matting is made from the split reeds, and also various baskets used in marketing. The reeds are used for the dunnage of boats, walling of pân-baris, &c.
Oriza sativa, *Willd.* ...	BANI-DHAN.—Found in all parts of the forest on the sloping alluvium of river banks from the northern boundary to the sea-face, wild, or as an escape from cultivation. Of no economic value.
O. coarctata, *Roxb.* ...	BANI-DHAN.—Of the same distribution as the foregoing, but a distinct species, from which all the cultivated sorts have probably been derived.
Saccharum cylindricum, *Linn.*	ULU, UNU.—Found on clearings in and immediately north of the reserved forests and extensively used for thatching.
Filices.	
Acrostichum aureum, *Linn.*	UDOBAN.—Common throughout the Sunderbans in clumps associated with pandanus. The leaves are used in thatching.
A. scandens, *Linn* ...	DHEKWA, DEHIA.—A common climbing fern of the reserved forests. The leaves are used in thatching.

APPENDIX C.

Observations on rates of growth.

Ring-countings of Sundri stump-sections.

Number of section.	Number of rings.	Girth.	Rings per foot of girth.	Number of section.	Number of rings.	Girth.	Rings per foot of girth.
1	22	1′2″	18·85	60	25	1′5″	17·64
2	53	2′4″	22·71	61	21	1′3″	16·80
3	75	2′11″	25·71	62	26	1′5″	18·35
4	103	4′6″	22·88	63	24	1′2″	20·57
5	74	2′5″	30 62*	64	34	1′10″	18·54
6	48	2′2″	22·15	65	25	1′4″	18·75
7	80	3′10″	20·87	66	31	1′8″	18 60
8	99	4′0″	24·75	67	38	2′2″	17·53
9	108	6′3″	17 28	68	43	2′0″	21·50
10	82	4′3″	19 29	69	33	1′10″	18 00
11	84	3′2″	26·52	70	27	1′6″	18·00
12	25	1′1″	23·07	71	67	3′5″	19·61
13	34	2′3″	15·11	72	58	3′0″	19·33
14	45	2′5″	18 62	73	73	3′9″	19·46
15	42	2′4″	18·00	74	41	2′2″	18 92
16	33	1′9″	18 85	75	46	2′5″	19 03
17	47	2′3″	20·83	76	38	1′9″	21·71
18	52	2′5″	21 51	77	43	2′2″	19 84
19	34	2′0″	17 00	78	43	2′0″	21·50
20	48	1′11″	25·04	79	37	1′10″	20 18
21	32	2′2″	14·76	80	37	2′2″	17·08
22	46	1′8″	27·60*	81	34	1′7″	21 47
23	80	3′0″	26·66	82	45	2′2″	20·76
24	94	3′10″	24 52	83	28	1′9″	16·00
25	39	1′9″	22·28	84	23	1′9″	13·14
26	27	1′10″	14·72	85	42	1′11″	21 91
27	67	2′0″	33·50*	86	36	1′10″	19·63
28	64	2′6″	25 60	87	39	2′7″	15·09
29	63	2′1″	30 24*	88	26	1′2″	22 28
30	63	2′4″	27·00*	89	34	1′8″	20·40
31	55	2′3″	24 44	90	41	2′2″	18·92
32	74	2′10″	26·11	91	61	3′0″	20·33
33	63	2′4″	27·00*	92	70	3′4″	21·00
34	61	2′4″	26·14	93	62	3′0″	21·00
35	84	3′6″	24·00	94	55	2′4″	23·57
36	120	4′10″	24·82	95	43	2′6″	17·20
37	44	2′2″	20·30	96	28	1′5″	19·76
38	39	2′0″	19·50	97	41	2′2″	18·92
39	47	2′2″	21·69	98	51	3′3″	15 69
40	52	2′4″	22·28	99	33	1′7″	20·84
41	23	0′11″	25·09	100	29	1′4″	21·75
42	44	2′2″	20·30	101	36	1′10″	19·63
43	23	1′7″	14·52	102	29	1′2″	24·85
44	41	2′3″	18·22	103	58	2′5″	24·00
45	24	1′4″	18·00	104	36	1′9″	20·57
46	28	1′8″	16·80	105	61	3′0″	20·33
47	35	1′9″	20·00	106	33	2′3″	14 30
48	40	2′0″	20·00	107	30	1′6″	20·00
49	45	2′2″	20 76	108	27	1′4″	20·25
50	41	2′4″	17·57	109	31	1′3″	24·80
51	55	2′5″	22·76	110	45	2′4″	19·28
52	31	2′3″	13·77	111	29	1′10″	15·82
53	34	1′6″	22·66	112	30	1′8″	18 00
54	40	2′6″	16 00	113	38	2′5″	15·72
55	30	1′2″	25·71	114	52	2′2″	24·00
56	36	1′11″	18·78	115	29	1′7″	18·32
57	25	1′6″	16·66	116	40	2′0″	20·00
58	30	1′6″	20·00	117	34	1′6″	22·67
59	20	1′0″	20 00	118	28	1′6″	18·67

* These results were rejected in striking the average.

Number of section.	Number of rings.	Girth.	Rings per foot of girth.	Number of section.	Number of rings.	Girth.	Rings per foot of girth.
119	38	2′3″	16·88	148	67	3′4″	20·10
120	38	2′2″	17·54	149	31	1′11″	16·17
121	41	2′3″	18 22	150	38	1′8″	22·80
122	26	1′6″	17·33	151	29	1′4″	21·75
123	27	1′6″	18·00	152	29	1′5″	20·47
124	26	1′0″	26·00	153	43	2′2″	19·84
125	36	1′5″	25·41	154	35	1′5″	24·64
126	28	1′4″	21·00	155	31	1′2″	26 57
127	29	1′3″	23·20	156	43	2′0″	21·50
128	40	2′3″	17·77	157	36	2′0″	18·00
129	27	1′11″	14·08	158	41	1′8″	24·60
130	32	1′7″	20·21	159	39	1′7″	24·63
131	25	1′8″	15·00	160	36	1′10″	19·64
132	67	3′1″	21·73	161	32	1′4″	24·00
133	31	1′7″	19·58	162	27	1′4″	20·25
134	83	4′3″	19·53	163	61	3′3″	18·77
135	66	3′2″	20·84	164	74	4′2″	17·76
136	65	3′0″	21·66	165	97	5′0″	19·40
137	33	1′10″	18·00	166	71	4′0″	17·75
138	37	2′0″	18·50	167	82	2′11″	28·11*
139	32	1′8″	19·20	168	88	3′9″	23·46
140	40	2′1″	19·20	169	90	4′7″	19·63
141	37	1′5″	26·11	170	58	3′2″	18·31
142	44	2′1″	21·12	171	78	4′3″	18·35
143	35	1′10″	19·09	172	70	3′9″	18·66
144	26	1′7″	16·42	173	64	3′5″	18·73
145	31	1′9″	17·71	174	38	2′0″	19 00
146	21	1′1″	19·38	175	32	2′0″	16·00
147	36	1′6″	24·00	...	...	...	...

* These results were rejected in striking the average.

Total.

Number of sections.	Number of rings.	Sum of girths.
168.	7,443.	370′ 2″.

Average number of rings per foot of girth.
20·11.

APPENDIX D.

RECORD OF RESULTS OF VALUATION SURVEYS.

No.	Line of Survey.	Species.	GIRTH IN FEET.					
			9″ to 1	1—2	2—3	3—4	4—5	5 and over
1	From the right bank of the Bhola river, opposite the Sarankhola khal, due westwards, 850 yards. Area, 1 75 acres.	Sundri ...	1,518	239	28	6	1	...
		Pussur ...	...	2	...	...	...	...
		Amur ...	64	1	...	...	...	...
		Keora ..	..	..	...	...	...	...
		Other ...	365	15	21	2	2	5
							3	...
2	From the eastern end of the Khurma khal, south-westwards, 1,800 yards. Area, 3 7 acres.	Sundri ...	1,838	966	79	4	...	...
		Pussur ...	1	3	1	...	...	...
		Amur ..	67	30	...	...	...	...
		Keora ...	...	...	...	...	...	...
		Other ..	994	422	61	23	3	...

No.	Line of Survey.	Species.	Girth in feet.					
			9″ to 1	1—2	2—3	3—4	4—5	5 and over.
3	Four miles from the southern end of the Arpangassia khal, eastwards, 2,950 yards. Area, 6 acres.	Sundri ...	5,144	1,485	283	25	8	2
		Pussur ..	2	1	...	...	...	...
		Amur ...	182	29	3	...	...	...
		Keora ..	...	...	...	...	...	...
		Other ..	1,035	456	162	15	4	3
4	From the mouth of the Laodobe khal, south-westwards, 1,936 yards. Area, 4 acres.	Sundri ...	2,559	604	86	10	...	...
		Pussur ...	62	25	8	1	...	...
		Amur ...	256	39	1	...	...	...
		Keora ...	...	...	...	...	...	...
		Other ...	1,723	605	229	77	13	13
5	From the mouth of the Laodobe khal, south-eastwards, 1,452 yards. Area, 3 acres.	Sundri ...	2,100	519	138	8	2	...
		Pussur ...	12	7	4	...	...	...
		Amur ...	163	12	2	...	...	...
		Keora ...	...	...	...	...	...	...
		Other ...	1,304	373	68	24	5	12
6	Between the Bentmori, Kotkukota, and Supoti rivers, 2,100 yards. Area, 4·3 acres.	Sundri ...	2,926	702	89	8	...	...
		Pussur ..	...	2	...	...	...	...
		Amur ...	11	...	...	...	...	...
		Keora ...	...	...	...	...	...	...
		Other ...	8,645	2,551	374	30	...	...
7	Between the Pussur and Bangarah rivers, 700 yards. Area, 1·44 acres.	Sundri ...	845	235	30	4	...	...
		Pussur ...	...	...	...	...	...	...
		Amur ...	13	...	...	...	...	...
		Keora ...	...	...	...	...	...	...
		Other ...	4,350	730	204	25	...	...
8	From the right bank of the Honduras river, westward, 725 yards. Area, 1·5 acres.	Sundri ..	1,405	425	38	7	...	...
		Pussur ...	...	...	...	...	...	...
		Amur ...	75	2	...	...	...	...
		Keora ...	...	...	...	...	...	...
		Other ..	3,885	840	125	24	...	...
9	From the right bank of the Sonakhali, westward, 625 yards. Area, 1·3 acres.	Sundri ...	1,640	277	32	12	4	...
		Pussur ...	...	...	...	...	...	...
		Amur ...	328	55	...	...	...	...
		Keora ...	...	...	...	...	...	...
		Other ...	1,510	217	62	17	3	...
10	From the left bank of the Sonakhali, eastward, 825 yards. Area, 1·7 acres.	Sundri ...	2,908	456	13	3	1	...
		Pussur ...	1	...	...	...	...	...
		Amur ...	25	2	...	...	...	...
		Keora ...	...	...	...	...	...	...
		Other ...	915	77	...	...	...	...

Number of Sundri trees per acre.

No. of Survey.	Working Circle.	No. of Coupe.	Girth in feet.			
			9″ to 1	1—2	2—3	3 and over.
1	Bagirhat	10	867	136	16	4
2	Ditto	9	496	261	21	1
3	Khulna	2	857	247	47	6
4	Do.	9	639	151	21	2
5	Do.	10	700	173	46	3
6	Bagirhat	5	680	163	20	2
7	Ditto	7	586	163	21	3
8	Khulna	7	937	283	25	5
9	Do.	4	1,260	213	25	12
10	Do.	4	1,710	262	8	2
	Average ...		873	205	25	4

APPENDIX E.

DESCRIPTION OF CROP ON LINES OF SURVEY.

No. of survey.	Working Circle.	Description of Crop.
1	Bagirhat ...	The outer belt of forest, 30 yards broad, contained golpatta, with a few sundri saplings and shingar poles, much encumbered with the bhola climber. The sundri forest behind this belt consisted of a mixed crop containing 75 per cent. of sundri, chiefly saplings, and low poles (1-2 feet girth), and 25 per cent. of gengwa, pussur, amur, baen, and goran. Sundri and gengwa seedlings were very numerous.
2	Bagirhat ...	The crop for 125 yards from the river bank was composed of low poles of gengwa, jhow, and kankra, with undergrowth of young hantal and hargoza. Then low and high poles of sundri in the proportion of 35 of the former to 1 of the latter class, associated with gengwa, baen, and a few amur, the under-growth consisting of clumps of pandanus. At 400 yards from the river bank the crop of sundri saplings and low poles was very dense, mixed with shingar, kerran, badal, kumia, &c. Canopy here, as elsewhere in the Sunderbans, generally uninterrupted. Bhola climbers formed tangled masses in places, barring further progress, and causing deflection in the line of survey. The banks of khals in the interior were fringed by clumps of pandanus jungle, usually impenetrable.
3	Khulna ...	A belt of forest, 50 yards broad, composed of ora, gengwa, and baen, with hantal and pandanus under-growth; then a dense pole forest of sundri, chiefly of low poles, associated with amur, gengwa, kankra, kerran, and kumia. In swampy hollows and low-lying ground a few pussur were found, with amur and shingar, as well as golpatta, the under-growth here consisting of udoban and hargoza. Sundri reproduction very good.
4	Khulna ...	This was a low-lying and very swampy area, containing a number of young pussur trees. The outer belt, undefined, contained ora, koilsha, &c; then a mixed crop of sundri low poles associated with an equal number of the accessory species, consisting of pussur, amur, gengwa, baen, kumia, kankra, dakur, and shingar. The under-growth contained pandanus, udoban, and hargoza, with several bhaoli, bhola, and kelia climbers. Sundri and pussur seedlings very numerous.
5	Khulna ...	A belt of forest, 50 yards broad, composed of ora, kankra, koilsha, kumia, golpatta and a few sundri low poles; then a sundri pole forest in which the low poles were as usual most numerous, associated with pussur, amur, kumia, and dakur, with pandanus under-growth and bhola climbers. At 800 yards a poor crop of sundri poles, with several decayed stumps of sundri trees out in former years Further on a much better crop of sundri high poles associated with amur, baen, kankra, dakur, shingar, badal, and gengwa. Soil very swampy, with innumerable blind root-suckers. Amur seedlings numerous. Sundri reproduction fairly good

No. of survey.	Working Circle.	Description of Crop.
6	Bagirhat ...	The predominating species in this tract being goran, the outer zone was somewhat ill-defined. Few sundri low poles were counted and still fewer high poles, the latter class stunted and stag-headed. The trees in association with the goran consisted of gengwa, kirpa, shingar, dhundol, and badal, with bhaoli and gila climbers and hantal under-growth. There were considerable numbers of sundri seedlings in the drift debris of the river; but in the interior while goran and gengwa reproduction was good, that of sundri was noted as being exceptionally poor.
7	Bagirhat ...	A tract of similar composition and density of crop as the former. Goran seedlings very abundant; gengwa seedlings not so numerous, and sundri seedlings comparatively few.
8	Khulna ...	Another tract like the foregoing. The growth of goran was excellent; but the gengwa and sundri trees were mostly dwarfed and stag-headed wherever the trees had outgrown the average height of the crop, here 20—25 feet. This is believed to be owing to the exposure of the tops of the gengwa and sundri trees to the violence of the strong winds of the south-west monsoon. The proportion of sundri was found to increase with the distance of the crop from the river bank.
9	Khulna ...	A belt of forest, 80 yards broad, of goran, gengwa, shingar, and a few sundri poles, with kelia climbers and odoban under-growth; then a crop of low poles of sundri mixed with 50 per cent. of amur, gengwa, &c. The larger sundri trees appeared in most cases to have been left unfelled by the wood-cutters owing to shortness or unsoundness of bole, or other defects. Three khals were crossed with some difficulty, and further progress barred by a fourth. None of these khals are shown on the map of the Sundarbans compiled by Mr. Ellison in 1873.
10	Khulna ...	A belt of forest, about 50 yards broad, containing golpatta shingar, gengwa, and baen; then a nearly pure crop of sundri, chiefly saplings, and low poles. Sundri reproduction was excellent. Along some parts of the line goran was met with. The ground was covered with a saline efflorescence.

Summary of Results.

"Sundri" reproduction was found to be nearly everywhere excellent, seedlings and saplings of this species being very numerous. The crop is chiefly in the low pole stage, and high poles are most numerous in the central parts, and least numerous in the southern parts of the Bagerhat and Khulna Working Circles. Throughout the area examined the classes are represented as follows:—

Class I.—Trees, 3 feet and more in girth (breast-high) ...		Comparatively few.
„ II.—High poles, 2—3 feet	„ ...	Fairly numerous.
„ III.—Low poles, 1—2 feet	„ ...	Numerous.
„ IV—Saplings, 9″ to 1 foot	„ ...	Very numerous.

"Pussur" and "amur" are irregularly distributed and badly represented. "Keora," usually found near river banks forming pure or mixed crop, is in many places entirely unrepresented.

APPENDIX F.

Administrative Rules and Executive Orders pertaining to the Sunderban Forest Division.

Rules for regulating the Export of Forest Produce from the Forests of the Sunderban Forest Division, Bengal.

GENERAL.

I.—Classification of Forest Produce, and Royalty leviable thereon.

No trees, timber, or any other forest produce shall be cut, sawn, gathered, or removed from the Sunderban Government Forests, without prepayment in full of the charges due thereon at the under-mentioned rates, and in accordance with the following classification:—

Notification No. 1397 For., dated the 12th April 1892, published at page 403, Part I of the *Calcutta Gazette* of the 13th idem.

Timber of the following kinds in pieces of any length, but not less than three feet in girth at the thick end, shall be classed as *logs*, and be charged for as follows:—

Sundri—One and-a-quarter annas per "running foot."
Pussur and *Amur*—One anna per running foot.
Logs of any other species—One-half anna per running foot.

Pieces of wood measuring eight feet and upwards in length, and under three feet in girth at the thick end, shall be classed as *poles*, and be charged for as follows:—

Sundri—One anna per maund ... ...
Pussur, *Amur*, and *Goran*—Nine pies per maund ... } Boat measurement.
Poles of any other species—Six pies per maund ...

Pieces of wood measuring less than eight feet in length, and of which the girth at the thick end is under three feet, shall be classed as *firewood*, and be charged for as follows:—

Sundri—Nine pies per maund ... ...
Goran—Six pies per maund ... ... } Boat measurement.
Other kinds of firewood—Three pies per maund ...

Wax and *Honey*—One rupee per maund.
All other forest produce—Three pies per maund ... Boat measurement.

II.—Conditions under which Permits or Licenses are granted.

Any person desiring to enter the Sunderban Government Forests for the purpose of cutting, sawing, converting, gathering or removing trees, timber, or other forest produce, shall take out a permit or license for the produce which he proposes to remove. The said permit shall be in the form prescribed in the notification of the 10th December 1889, published at page 1034, Part I of the *Calcutta Gazette* of the 18th idem, and shall be subject to the conditions* printed on the back thereof. It shall be granted by the officer in charge of the Sunderban Forest Division, or by any of his subordinates duly authorised to issue permits, on prepayment only of the prescribed charges.

Notification dated the 9th March 1886, published at page 194, Part 1 of the *Calcutta Gazette* of the 10th idem.

* *Conditions referred to above.*—1. No produce of any kind, except that named in this permit, shall be cut, damaged or removed, and this permit is valid only for the forest or block, period of time, and number or quantity of the particular produce named in it, and it holds good for one trip only into and from the forests of the boat or boats for which it is issued. If this condition be violated, this permit becomes null and void.

2. It shall always be kept ready for inspection in the hands of the person or persons exercising the permission it grants.

3. The holder shall always produce it when called upon to do so by any forest or police officer.

4. He shall return it to the office of issue, or to a corresponding office of the same Forest Division, before the expiry of the term for which it is issued, and shall at the same time bring the boat or boats for which it was issued for the purpose of the forest produce, laden on the said boat or boats, being examined and the measurements being checked. In the case of logs slung on to boats, they must be slung in such a manner as will allow of their being examined and measured, *i.e.*, they must not be slung more than two deep under water.

5. On returning it, the certificate attached will be filled in and made over to the holder, as an acknowledgment that he has paid the full amount due on the timber or produce removed under this grant.

6. The fact of holding this permit, without the certificate attached having been filled in and signed by a Forest Ranger or Forester, does not give the holder permission to proceed with any timber or forest produce past any authorised forest or revenue station; *should he do so without holding the certificate filled in and signed by a Forest Ranger or Forester, this permit becomes null and void*, and in that case he renders himself liable to the punishments prescribed by the sections applicable under the Forest Act for removing timber and produce without permission, which may extend to imprisonment for six months, or to a fine of Rs. 500, or both, in addition to the confiscation of all timber or forest produce removed, and of all tools, boats carts, and cattle used in removing it.

III.—Revenue Stations at which Permits or Licenses are issued.

Permits or licenses for the cutting, sawing, converting, gathering, or removal of any forest produce within the boundaries of the Sunderban Government Forests can be obtained from the officers in charge of the under-mentioned Revenue Stations:—

Notification as to *Rule II*, and that dated the 5th November 1888, published at page 941 Part I of the *Calcutta Gazette* of the 7th idem.

No.	Name.	Situation.
1.	Mud Point ...	Junction of Dhán khál and Múriganga river.
2.	Shikárpúr ...	Junction of Shikárpur khál and Múriganga river.
3.	Nalkora ...	Junction of Raidighi and Múni kháls.
4.	Miraguoj ...	Junction of Jhamar and Baski kháls.

No.	Name.	Situation.
5.	Basrah ...	Right bank of Bidyadhari canal near railway station.
6.	Sámakpatha ...	Junction of Tolly's Nala and Bidyadhari canal.
7.	Bámanghatta...	Left bank of Bangor katta khál.
8	Mutiah ...	Near Canning Railway station, right bank of Mutlah river.
9.	Rámpura ...	Junction of Gotyahárágáng and Barákálgátchya river.
10.	Sáhibkháli ...	Junction of Canay kati khál and Raimangal river.
11.	Bassantpur ...	Junction of Kalindi nadi and Jabúna river.
12.	Halderkháli ...	Junction of Halderkháli and Mánda river.
13.	Burigoálni ..	Junction of Chuargáng and Colputto river.
14.	Cobaduk ...	Junction of Colputto and Arpangassia river.
15.	Cassee-ábád ...	Junction of Hogla khál and Shakbaria river.
16.	Baniakháli ...	Junction of Bania Hodda and Mysalúr kháls.
17.	Dháki ...	Junction of Dháki and Sipsa rivers.
18.	Dacope ...	Junction of Bhaddar river and Chúnkori khál.
19.	Khulna ...	Junction of Bhyrub and Pussur rivers.
20.	Shella ...	Junction of Mangla nadi and Pussur river.
21.	Chandpie ...	Junction of Chila, Chándpie, and Khúrma kháls.
22.	Jewdhárá ...	Junction of Bhola river and Jewdhárá khál.
23.	Supoti ...	Junction of Supoti, Bará-borni, and Páncassia rivers

IV.—Examination of Boats by Forest or Police officers.

Any forest produce in transit within, or passing out of, the Sunderban Government Forests, and any such produce found in any water-channel skirting or leading from the said Forests, when there is reason to believe that anything is payable to the Government in respect of such produce, may be stopped and examined by any forest or police officer.

Notification as for *Rule II*, and that dated the 10th May 1887, published at page 367, Part I of the *Calcutta Gazette* of the 11th idem.

V.—Conditions under which Right-of-Way Passes are issued, and fees payable for such passes.

Any person, not a purchaser of Government timber under *Rule II* of these Rules, who desires to transport any forest produce through the Sunderban Forests, or through lands that have been, or may hereafter be, leased under the rules for the lease of waste lands in the Sunderbans of the 24-Parganas, Khulna, and Backergunge, or through any part of the said Forests or leased lands, or through any of the water-channels intersecting *or skirting them*, shall take out a pass in the following form at one of the revenue stations, and he shall further produce such pass when called upon to do so by any forest or police officer, and return such pass at any one of the said stations on passing out of the boundary of the forest.

Notification dated the 6th September 1888, published at page 806, Part I of the *Calcutta Gazette* of the 12th idem.

The fees payable for such passes shall be as follows, according to boat measurement:—

Sundri, *Pussur*, and *Amur* timber	...	...	2 pies per maund.
Keora timber	...	...	1 pie ,, ,,
All other forest produce ...	...	...	½ pie ,, ,,

Form of Right-of-Way pass.

No. 1.

Pass No. — পাশ নং — ইং ১৮৯ ।

Name — নাম

Father's name — পিতার নাম

Occupation — ব্যবসায়

Residence ... { Village / Thana / District } — বাসস্থান ... { গ্রাম / থানা / জিলা }

Bound for — চালান — জন্য

is authorized to pass through the Forests, — সুন্দরবনের জঙ্গলের মধ্যে দিয়া যাইতে ক্ষমতা দেওয়া গেল ।

vid — নদী

His boat measured ... maunds — উহার নৌকার মাপ ... মোন এবং

and he holds a pass to cut in the aforesaid lot — উপরোক্ত লটের মধ্যে কাটিবার জন্য যে পাশ

signed by — দাইয়াছে তাহা

Date of expiry of grant — দ্বারায় স্বাক্ষরিত ।

Amount paid Rs. — মেয়াদ উত্তীর্ণের

DATED

The 189 .

Forester _____ *Sunderban Division.*

_____ *Station.*

VI.—Conditions under which Forest Produce may be exported from Leased Lots.

Notification as to *R's V.*

Any person who desires to transport any forest produce from lots that have been leased under the rules for the lease of waste lands in the Sunderbans of the 24-Parganas, Khulna, and Backergunge, dated the 12th November 1879, through any of the water-channels mentioned in Rule V, must—

(*i*) hold a *Printed License* duly filled up in accordance with the sample form to be obtained from the office of the officer in charge of the Sunderban Forest Division at Khulna, and signed either by the lessee himself, or by an authorised and recognised agent of the lessee, whose signature and residence must be recorded in the office of the said officer at Khulna, the Printed License so filled up being produced by the holder for inspection when he is called upon to do so by any forest or police officer; and

(*ii*) obtain a *Permit* at a revenue station by prepayment in full of the charges leviable thereon, according to the rates for such produce prescribed under *Rule 1.*

Form of Printed License.

LICENSE No _____, DATED _____

GRANTED to _____ son of _____, resident of _____, thana _____, district _____, to transport forest produce from Lot No. _____ in accordance with Rule II of the Bengal Government Notification of the 8th September 1888, and on condition that the license-holder complies with Rule I of that notification and takes out a permit at a forest revenue station, prepaying the Forest Officer in charge of that station the royalty prescribed in Bengal Government Notification of the 12th April 1892.

CERTIFIED that I have explained to the license-holder the terms under which this license is hereby granted

(Signature of *Lessee* or authorised *Agent*) _____

Residence { Village _____ Thana _____ District _____

VII.—Registration of Boats, and fees payable thereon.

Notification dated the 12th September 1880, published at page 832, Part I of the *Calcutta Gazette* of the 15th idem.

Any persons trading in timber or forest produce, or desirous of purchasing and removing forest produce from the Sunderban Government Forests, may, if they so desire, and in place of having their boats as heretofore measured on every occasion on which they enter or leave those forests, or pass any of the forest revenue stations, have their boats measured once for all and such measurement registered by the Deputy Conservator of Forests, or his subordinates, at any of those revenue stations.

Such registration will hold good for the period of one year, and may be renewed after the expiry of that period.

Any boat, the measurement of which is so registered, will not be liable to further remeasurement or detention either within the forests, or at the forest revenue stations, provided—

(1) that the boat does not contain any forest produce other than that entered in the permit; and

(2) that the load does not exceed the registered burden as shown by the mark on the water-line.

All boats registered will have the maundage and date of measurement painted in letters not less than four inches long on both sides of the bow; and amid-ships on either side will be painted the water-line, or line showing the loaded draft. This last will be indicated by a circle painted in white, intersected by a red line marking the depth to which the boat may be loaded. This line will be fixed at the pleasure of the manjhi before measurement is made, and the measurement will be made accordingly.

The fees payable when a boat is registered for the first time shall be according to the following scale:—

			Rs.	A.	P
Boats not exceeding	50 maunds	... ...	0	4	0
Above 50 and not exceeding	100 "	... ...	0	8	0
" 100 " "	500 "	... ...	0	12	0
" 500 " "	1,000 "	... ...	1	8	0
" 1,000 " "	2,000 "	... ...	2	0	0
" 2,000 " "	3,000 "	... ...	3	0	0
" 3,000 maunds	..	... ...	4	0	0

On renewal of the registration after the expiry of twelve months, fees shall be payable at half the rates given in the above scale, provided that application is made for such renewal of registration within two months of the expiry of the said twelve months. After that period the full fees will be payable as for fresh registration.

VIII.—Registration of Property-Marks, and fees payable thereon.

All persons transporting timber through any portion of the Sunderban Government Forests shall annually register their property-marks in the office of the Divisional Forest Officer. Such marks shall consist of a device to be approved by the Divisional Forest Officer, and a certificate of registration, showing the device registered, shall be given to each person who registers his property-mark. Copies of the certificate shall be forwarded to the officers in charge of the several revenue stations, as well as to the Conservator of Forests.

Notification dated the 12th October 1880, published at page 940, Part I of the *Calcutta Gazette* of the 14th idem.

The registration fee payable for each property-mark shall be Rs. 2 for a first registration and annas 8 for each subsequent annual renewal; provided—

(1) that the lower rate (annas 8) will be payable under this rule by persons who hold certificates of registration under the rules of the 16th February 1871, passed under Act VII of 1865, and who renew them within twelve months of the date of their last renewal,

(2) that should more than twelve months elapse in any case from the date of first registration under these rules, or from the date of any renewal, the full fee payable on first registration (Rs. 2) shall be levied for the subsequent registration of each property-mark; and

(3) that the Divisional Forest Officer may refuse to register more than one property-mark for any one person, should he consider it desirable to do so.

IX.—Conditions under which Drift and Stranded Timber may be collected.

The following are the areas within which all unmarked wood and timber shall be the property of Government, unless and until any person establishes his right and title thereto under the provisions of the Indian Forest Act, VII of 1878, and the rules made under it, namely, *the sea-shore and the rivers and creeks in the districts of the 24-Parganas and Khulna, so far as they are included within the boundary of the Sunderban Government Forests.*

Notification dated the 3rd November 1879, published at page 1085, Part I of the *Calcutta Gazette* of the 5th idem.

The following rules framed under section 51 of the Indian Forest Act, VII of 1878, apply to the collection of drift and stranded timber within the above area:—

Notification dated the 16th February 1881, published at page 222, Part I of the *Calcutta Gazette* of the 23rd idem.

1. *Interpretation clause.*—All words used in these rules and defined in the Indian Forest Act, VII of 1878, shall be deemed to have the meanings respectively attributed to them by the said Act.

And in these rules 'Drift Timber' shall mean timber of the descriptions mentioned in section 45 of the said Act.

2. *Procedure to be used in obtaining permits to collect drift timber.*—Any person who, within the area of the Sunderbans to which section 45 of the Act has been extended, wishes to salve drift timber, shall apply to the officer in charge of the Sunderban Forest Division for a written permit, specifying the nature of the timber which he wishes to salve, and shall register the boat or boats to be used in salving.

Every boat so registered shall have conspicuously painted on it its register number, the date of registration, and a letter indicating the revenue station at which such boat was registered. A fee of Rs. 5 shall be levied for each boat for the first registration, and a fee of one-half this amount for every subsequent registration. Every registration shall hold good for one year from the date thereon. Provided that if any person shall wish to enter the area defined above for the purpose of salving drift timber, the property of himself or of any known owner, a written permit for this special purpose may be granted him by the officer in charge of the Sunderban Forest Division on payment of a fee of Rs. 2 only; but such person shall be bound by all the conditions regarding the registration and marking of his boats laid down in this rule.

3. *Salved timber to be taken to drift timber depôts.*—All timber salved shall be taken, with as little delay as possible, to the nearest drift timber depôt.

4. *Nothing to prevent chance timber being salved.*—Nothing in the preceding rules shall be held to prevent any person, lawfully plying a boat within the limits of the Sunderban Government Forests, from salving any drift timber that he may find.

5. *Salved timber which may become vested in Government to be sold by auction.*—All drift timber salved under these rules, which may become vested in Government under section 48 of the Indian Forest Act, shall be sold by auction within such periods and in such manner as the Conservator of Forests may direct.

6. *Amount of salvage.*—(*a*) Any person, whether a Forest Officer or not, who has salved any drift timber, shall be entitled to receive as salvage an amount equivalent to 15 per cent. of the estimated value of such drift timber, as adjudged by the Sunderban Divisional Officer, or by any subordinate officer specially authorised by the Conservator of Forests in that behalf.

(*b*) Provided that any person authorised by permit to salve drift timber under Rule 2 shall receive as salvage an amount equivalent to 25 per cent. of the estimated value of the drift timber salved by him, such value being adjudged as above provided.

(*c*) In special cases the Conservator of Forests may increase the amount of salvage to a sum not exceeding 50 per cent. of the estimated value of the drift timber salved.

(*d*) When more persons than one are concerned in salving, the amount of salvage shall be paid to them collectively and on their joint receipt.

7. *Payments required when drift timber is proved to be the property of a claimant*.—If the drift timber collected shall be shown under section 47 of the Act to be the property of any person other than Government, such person shall be liable to pay to Government, under section 50 of the Act, the following amounts, viz.:—

(*i*) The actual amount of salvage paid to the salver.
(*ii*) The actual cost incurred in moving the timber to the drift depôt.
(*iii*) Such fees as may, from time to time, be fixed, with the sanction of Government, for the storing of timber at such depôt.

8. *Registration of property-marks*.—Any person holding a permit under Rule 2, who makes use of any property-mark or device for marking drift timber salved by him, may register the same in the office of the Sunderban Forest Divisional Officer. The fee to be paid for such registration shall be one rupee for the first year, and eight annas for each annual renewal. A certificate of registration showing the marks registered shall be given on payment of the prescribed fee.

9. *Penalty clause*.—Any person who shall infringe any of these rules shall be punished with imprisonment for a term which may extend to six months, or with fine which may extend to five hundred rupees, or with both.

X.—Time-expired Permits, and fees leviable thereon.

Any person who, having received a permit under *Rule II* of these Rules, infringes condition 4 of the conditions printed on the back of the permit, shall pay the following time-expiry fees, namely—

For overstaying the time allowed him by	6 days	...	¼	extra royalty.
" " "	by 7 "	...	½	" "
" " "	by 8 "	...	¾	" "
" " "	by 9 to 11 days		full	" "
" " "	by 12 days and more,		double	" "

Provided that when the permit-holder can prove that he has been unavoidably detained by circumstances beyond his control, such as the death, sickness, or desertion of members of his crew, or by unusual stress of weather, the period of such detention may be added to the time allowed him under the permit when calculating the amount of the time-expiry fee to be paid by him under this rule.

XI.—Time allowed on Permits.

The time entered for trips to and from the forests, as given in the following table, is the maximum time that can, under any circumstances, be allowed at the time the permit is issued. If the person who applies for the permit is going to load near the station at which he applies, the time given must be proportionately lessened.

In calculating time to be allowed for logs, boats taking permits for the number of logs given below will be considered as carrying the number of men specified, even though a smaller number are actually on board:—

Under 10 logs	... ...	2 men.
10 logs and under 20	... ...	3 "
20 " " 30	... ...	4 "
For every additional 10 logs, or number under 10	...	1 man.

If more men are on board, the time given for cutting and loading will be proportionately lessened.

In calculating time to be allowed for cutting and loading, &c., firewood, golpatta, nal, and hantal, and poles, boats of the maundage noted below will be considered as carrying not less than the number of men specified, even though a smaller number are actually on board:—

Up to	100 maunds	..	...	2 men.
Above	100 and up to	500 maunds	...	3 "
"	500 "	1,000 "	...	4 "
"	1,000 "	1,300 "	...	5 "
"	1,300 "	1,600 "	...	6 "
"	1,600 "	2,000 "	...	7 "
"	2,000 "	2,300 "	...	8 "
"	2,300 "	2,600 "	...	9 "
"	2,600 "	3,000 "	...	10 "

TIME TABLE.

REVENUE STATION.	Logs.	FIREWOOD, GOLPATTA, NAL, AND HANTAL.						POLES.		SHELLS.
		Time allowed for cutting, and loading boats				*Maximum* time for the trip to and from the forests.		Time allowed for cutting and loading.	*Maximum* time for the trip to and from the forests.	
		under 100 maunds.	of 100 and under 200 maunds.	over 200 and up to 1,000 maunds. Per 100 maunds.	over 1,000 maunds.	1st April to 31st August.	1st September to 31st March.			
		Days.	*Days.*	*Days.*	*Days.*	*Day .*	*Days.*	*Days.*	*Days.*	
BASRAH ... SAMAKPATHA BAMANGHATTA MUTLAH ... KHULNA ...	exclusive of time for trip, which will be the same as for firewood, &c., except in the case of logs slung or rafted, when 25 per cent. extra time will be allowed for the return trip.	1 to 10	5 to 14	3	2	25	15	4	30	Five maunds per man per day exclusiv of time for trip, which will be the same as for firewood, &c.
NALKORA ... MIRAGUNGE ... MUD POINT ... SHIKARPUR ...		1 to 10	5 to 14	3	2	30	15	4	25	
RAMPURA ... SAHIBKHALI ... BASSANTPUR ...		1 to 10	5 to 14	3	2	20	10	4	20	
HALDERKHALI BURIGOALNI ... COBADUK ... CASEMABAD ... BANIAKHALI ... DHAKI ... DACOPE ... SHELLA ... CHANDPIE ... JEWDHARA ... SUPOTI ...	For one log six days per man, or six rows one day for one log,	1 to 10	5 to 14	3	2	15	10	4	20	

XII.—Forest produce exempt from charges in certain cases.

No charge shall be made for any forest produce used merely to fix and support or protect the cargo loaded in the boat, but the officer in charge of the revenue station at which the certificate is granted must see that this concession is not abused.

Example.—If a few miscellaneous poles are placed on the top or along the sides of a load of golpatta in order to save the load from being blown away by the wind, no charge will be made for such miscellaneous poles; nor for jhools of any species other than Sundri, Pussur, Amur, or Keora.

XIII.—Miscellaneous rules.

Each permit and certificate shall be written in Bengali as well as in English.

The gazetted officers and forest patrols shall examine every boat met with by them in the course of their tours of inspection; and shall record in a bound book the particulars entered in the permit or certificate, and all discrepancies between such entries and the actual size of the boat or the contents of the cargo.

The entries in this record must be checked with the entries in the revenue register maintained at the revenue stations, as well as with the cash-book and with the counterfoils of permits issued.

SPECIAL.

XIV.—Rules relating to Timber (Logs and Poles).

1. Every log must be separately measured, and if a boat is loaded in such a way that this cannot be done, then the purchaser must re-arrange his logs until it can be done; his boat being detained for the purpose.

2. Two dinghies may be allowed free for any number of logs not less than 30.

3. (*a*)—When measuring logs, fractions of a foot should be disregarded if less than six inches, and counted as equal to a foot if six full inches or more.

(*b*)—When measuring boats, the length from the gura at the bow to the gura at the stern shall be taken in feet, fractions of a foot in excess being disregarded; and the depth from the bottom of the central gura, and the breadth at the central gura, shall be taken in feet and quarters of a foot, fractions of a quarter foot being disregarded.

In the case of boats of less than 1,000 maunds, fractions of 25 maunds should be disregarded; and in the case of boats of more than 1,000 maunds, fractions of 100 maunds should be disregarded.

4. Purchasers requiring permits for logs must in the first place be asked whether they want *dooms* or *gachs*; that is to say, logs of 10 feet in length and under, or logs exceeding 10 feet in length.

If they want *Sundri* "dooms," they must be charged (as first instalment of revenue) ten annas on each "doom."

If they want *Sundri* "gachs," they must be charged (as first instalment of revenue) one rupee on each "gach."

And the permits corresponding will be worded as follows:—

"First instalment of revenue on (50 Sundri) logs of 10 feet in length and under at 10 annas per log—Rs. (31-4-0)."

"First instalment of revenue on (50 Sundri) logs to exceed 10 feet in length at Re. 1 per log—Rs. (50)."

If the timber in question be not Sundri, the rates for first instalments of revenue shall be as under:—

	Dooms.	Gachs.
(*i*) *Pussur* and *Amur* ...	8 annas	12 annas } per log.
(*ii*) Miscellaneous* ...	4 „	6 „ }

* *Keora* and *Geagua* "dooms" under seven feet in length shall be charged (as first instalment of revenue) at the rate of two annas each.

Purchasers will not be permitted to bring out cargoes containing a mixture of "dooms" and "gachs," provided that the deviation from the terms of the permit shall not exceed 20 per cent. If the deviation exceed 20 per cent., the whole cargo will be charged for at one-and-a-half annas per running foot in the case of Sundri logs, one and-a-quarter annas per running foot in the case of Pussur and Amur logs, and one anna per running foot in the case of miscellaneous logs.

5. A permit will not be given for cargoes of mixed *kinds* of timber that are differently rated, *e.g.*, a permit will not be given for a mixture of Sundri and Pussur logs; a permit will not be given for a mixture of Goran and miscellaneous poles; but Pussur and Amur being rated the same, a permit may be given for a mixture of those logs.

The purchaser who brings out a cargo of mixed kinds of timber that are differently rated, will be dealt with as if his cargo comprised an unmixed load of the highest priced among the timbers included therein, and be charged accordingly.

6. A permit will not be given for cargoes of mixed *classes* of material, *e g.*, a permit will not be given for a mixture of logs and poles.

The purchaser who takes out a permit for logs will have all the pieces rated as logs, even if their dimensions in girth be those of poles.

The purchaser who takes out a permit for poles, and some of whose pieces are found to be logs, will, if the case be sufficiently serious, *i.e.*, if there be an obvious intention to defraud, be charged for every such log at four times the usual rate.

7. The number of pieces taken out by a purchaser must not exceed the number entered on his permit.

If the number of pieces taken out by a purchaser does exceed the number entered on his permit, the excess number will be charged for at the rate of—

Rs.	4	per piece in the case of	*Sundri*.
„	3	„ „	*Pussur* and *Amur*.
Re.	1-8	„ „	miscellaneous.

8. A permit will not be given for cargoes of Sundri poles to be felled in the Bagirhat Block.

The purchaser who fells and removes Sundri poles from the Bagirhat Block will be charged for such poles at four times the usual rate.

9. When a permit for "poles" is issued the word "poles" will not be used, but the permit will be worded:—

"Timber in pieces of less than 3 feet in girth at the thick end."

With each such permit a piece of string, 3 feet long, will be given to the purchaser.

10. The purchaser who takes out a permit for poles must be distinctly informed that he may not bark the ends of such poles.

The purchaser who takes out a permit for poles, and some of the ends of whose pieces are found to be barked, will, if the case be a sufficiently serious one, be charged for every such piece as if it were a log.

XV.—Rules relating to Firewood.

11. A permit will not be given for cargoes of mixed *kinds* of firewood that are separately rated, and if a more valuable kind of firewood than that for which the permit was issued be found in serious quantity in any such cargo, the whole of the firewood will be charged for at the rate of the most valuable fuel contained in that cargo.

12. A permit will not be given for cargoes of mixed *classes* of material, *e.g.*, a permit will not be given for a mixture of logs and firewood, or poles and firewood.

The purchaser whose load of firewood is found to comprise logs will, if the case be a sufficiently serious one, be charged for all such logs at four times the usual rate.

The purchaser whose load of firewood is found to comprise poles will, if the case be a sufficiently serious one, be charged for all such poles as follows:—

	Rs.	A.	P.	
Sundri poles	1	0	0	each.
Pussur, *Amur*, and *Goran* poles ..	0	12	0	„
Miscellaneous poles	0	8	0	„

13. When a permit for "firewood" is issued the permit will be worded:—"Firewood. Pieces of less than 3 feet in girth at the thick end, and less than 8 feet in length."

With each such permit a piece of string, 3 feet in length, and a piece of string 8 feet in length, will be given to the purchaser.

14. The purchaser who takes out a permit for firewood must be distinctly informed that he may not bark the ends of his pieces.

The purchaser who takes out a permit for firewood, and some of the ends of whose pieces are found to be barked will, if the case be a sufficiently serious one, be charged for every such piece as if it were a log.

XVI.—Rules relating to Other Forest Produce.

15. A permit will not be given for cargoes of mixed forest produce, *e.g.*, a permit will not be given for a cargo of nal-grass and golpatta, or for honey and shells, or for wood and hantal, &c.

The purchaser who brings out a cargo of mixed forest produce will be dealt with as follows:—

(*i*)—If the permit be for any other forest produce than wood, and the cargo include either timber or firewood, his boat shall be detained pending the orders of the Divisional Officer.

(*ii*)—If the permit be for wood, and the cargo include both wood and some other form of forest produce (not wax or honey), such other produce shall be charged for at the rate of six pies per maund, boat measurement.

(*iii*)—If the permit be for some form of minor forest produce (not wax or honey), and the cargo consist of more than one kind of such produce, the latter shall be charged for at six pies per maund, boat measurement.

(*iv*)—If the permit be for some form of forest produce (not wax or honey), and the cargo include wax or honey, the latter shall be charged for at double the usual rate.

Special powers of the Divisional Officer.

Notification dated the 26th June 1879, published at page 629, Part I, of the *Calcutta Gazette* of the 2nd July 1879.

India Government Notification No. 376, dated the 10th May 1878.

1. Power to issue search warrant and to hold enquiry in forest offence cases; and to receive and record evidence in the presence of the accused.

2. Power to grant refunds of forest revenue up to a maximum of Rs. 50 in each case.

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* *Powers conferred under the Indian Forest Act.*

1. The Divisional Officer is, *ex-officio*, empowered—

under section 20, to publish translation of notification of Reserved Forests;
„ 25, to permit prohibited acts in Reserved Forests;
„ 33, to permit prohibited acts in Protected Forests;
„ 45, to notify depôts for drift timber, &c.;
„ 46, to issue notice to claimants of drift timber, &c.;
„ 47, to decide claims to drift timber, &c.;
„ 50, to receive payments on account of drift timber, &c.;
„ 60, to direct release of property seized;
„ 67, to compound offences;
„ 82, to sell forest produce for Government dues.

* *Vide* notification dated the 14th October 1880, published at pages 997 and 998, Part I, of the *Calcutta Gazette* of the 17th idem; and notification dated the 9th July 1892, published at page 716, Part I, of the *Calcutta Gazette* of the 13th idem.

2. The Extra Assistant Conservators are, when specially authorised in that behalf by the Conservator of Forests, empowered—

under section 25, to permit prohibited acts in Reserved Forests;
" 33, to permit prohibited acts in Protected Forests;
" 60, to direct release of property seized;
" 67, to compound offences.

3. The Deputy Conservator, Extra Assistant Conservators, Rangers, Foresters, and Forest Guards of the Division, whether on permanent or temporary establishment, are empowered—

under section 45, to collect drift timber, &c.;
" 52, to seize property liable to confiscation;
" 55, to take charge of Government or confiscated property;
" 56, to accept charge of property when offender is unknown;
" 63, to arrest without warrant in certain cases;
" 69, to seize and impound cattle trespassing;
" 82, to take possession of produce under Government lien.

Rules to regulate Remittances of Revenue to Treasury, and advances to disbursers by Inland Money-order.

1. The gazetted officers of the Sunderban Forest Division will ordinarily, on their arrival at a revenue station, take over the revenue collected at that station since the occasion of their last inspection.

Notification dated the 11th May 1888 published at page 404, Part I, of the *Calcutta Gazette* of the 16th idem. Bengal Government letter No. 8261-I dated the 18th October 1892, to Conservator of Forests, Bengal. Conservator's Circular No. 1184, dated the 1st November 1892.

2. It is not intended that officers should avail themselves of the facilities afforded by the following rules, except where the course at present adopted is unsafe, or prejudicial to the interests of the Department, or very inconvenient.

3. Books containing inland money-order forms with counterfoils shall alone be used when making remittances to treasury, or advances to disbursers, through the agency of the post-office.

4. The remitter will take out a money-order in the ordinary form, at the most convenient post-office, and be careful to note briefly and clearly, on the coupon, the particulars of the remittance sufficient for the Treasury Officer's information, thus:—

"*Part forest revenue of the Cobadak revenue station for the month of July* 1892.
——————— *Forester in charge.*"

5. On receiving the carbonic receipt from the post-master, the remitter shall draw up his chalans in duplicate, and forward the same to the Treasury Officer direct, with a note of the number and date of the money-order taken from the receipt granted by the post-office.

6. The Treasury Officer on receipt of the chalans and of the money-order shall—

(*a*) sign the money-order acknowledgment and return it to the postman for transmission to the remitter, and
(*b*) return one of the chalans to the Divisional Officer.

7. The entry in the remitter's accounts will be supported by the money-order receipt and by the money-order acknowledgment.

8. The limit of the amount of a single money-order is the same as of any other ordinary money-order.

9. Fractions of an anna may be remitted to treasury, but not to disbursers.

10. The commission paid on money-orders will be charged to *BIII-f.* in the Forest Accounts.

Rules relating to the grant of Rewards under section 75 (b) of the Indian Forest Act.

1. All non-gazetted Government officers, and persons not in the employ of Government, are eligible for rewards under these rules.

Notification dated the 23rd October 1880, published at page 960, Part I, of the *Calcutta Gazette* of the 3rd November 1880 and Notification dated the 23rd September 1889, published at page 805, Part I, of the *Calcutta Gazette* of the 25th idem.

2. The Magistrate or the Court imposing the fine is bound to inform the Divisional Forest Officer, or the Sub-Divisional Officer not being below the rank of an Assistant Conservator of Forests, of the levy of the fine; and the whole or any part of the fine, when realised, may be distributed in such proportions as that officer may think fit among the persons instrumental in the detection of the offence, the seizure of the articles, or the capture of the offender.

Besides the amount of the fine the said persons shall also be entitled to share the whole or part of the proceeds of the sale of the confiscated articles.

The Forest Officer aforesaid may also, out of the fine realized, award compensation to any person subjected to annoyance or injury in connection with the proceedings in which the fine was imposed.

3. Rewards granted under these rules shall be disbursed at once, if they are less than Rs. 100.

If they are over Rs. 100, that sum only will be disbursed at once, and the rest after the period of appeal has expired, or the appeal has been rejected.

In the event of the conviction being reversed on appeal, the amount paid in rewards shall not be recovered from the persons to whom it has been paid, unless it shall appear that they have acted fraudulently.

4. In cases where, under section 67 of the Indian Forest Act, a Forest Officer has accepted a sum of money as compensation for any damage that has been committed, the Conservator of Forests may authorise the payment of a portion of the amount realised as a reward to any person, who may have contributed to the discovery of the offender.

Rule relating to the Grant of Badges for approved service.

Government of Bengal No. 3993 For., dated the 18th November 1892.
Conservator's Circular No. 140M, dated the 9th December 1892.

For every five years of approved service in the Department, Foresters, and officers of lower rank, will, with the previous sanction of the Conservator of Forests, be conceded the privilege of wearing one chevron of red braid on the left fore-arm, subject to a maximum of three chevrons.

Grant of Rewards for the destruction of Tigers.

Bengal Government Resolution, Judicial, dated the 25th September 1891, published as a Supplement to the *Calcutta Gazette* of the 7th October 1891.

1. The Forest Department, or the Civil Department, shall pay a reward of Rs. 50 for each full-grown tiger or tigress, and of Rs. 20 for each tiger-cub, proved to have been killed in the Sunderban Government Forests and in respect to which there is no reason to believe that a reward has already been given by the State on a previous occasion.

2. The skin and skull of each tiger, tigress, or tiger-cub killed should be taken either to a ranger or forester in the Sunderbans, by whom they should be retained until the arrival of a gazetted officer of the Sunderban Forest Division, and produced before him for inspection, or to the District Magistrate, or during the absence of the latter from head-quarters to the officer in charge of the district office for inspection.

3. The authorised rewards should be paid after the inspecting officer is thoroughly satisfied that the skin is intact and attached naturally to the skull, and that the animal was killed in the Sunderban Government Forests. He should also personally see that the skull is destroyed so that it cannot possibly be used again.

4. The amount of reward is chargeable in moieties to the Civil and Forest Departments, and the expenditure incurred on this account should be adjusted at the close of the financial year by those departments after mutual communication.

Rules relating to Hunting, Shooting, and the setting of Snares or Traps.

Notification of the 7th and 8th August 1868, published at pages 720 and 730, Part I, of the *Calcutta Gazette* of the 15th idem.

The following rules are promulgated under sections 25 (*i*) and 31 (*i*) of the Indian Forest Act:—

1. No person shall set snares or traps in the Sunderban Government Forests.

2. Between the 1st April and 30th September, both days inclusive, in each year, the killing of the following animals and birds is prohibited:—

Deer, florican, and jungle-fowl.

Also spur-fowl, all ducks that breed in the country, grey duck, comb duck, pink-headed duck, large and small whistling teal, and cotton teal.

3. Nothing in the above rules shall be deemed to prohibit any act done with the permission in writing of the Conservator of Forests, or of the Local Government.

Conditions under which Fakirs are allowed to establish Párás in the Sunderban Government Forests.

Any fakir who desires to establish a párá in the Sunderban Government Forests shall apply for a fakir's pass to the Forest Ranger in charge of the Shella revenue station. If there be nothing against the applicant he shall receive a pass free under the following conditions:—

1. The permit does not cover permission to cut or remove timber or other forest produce from the Government Forests.

2. The permit shall be returned to the Shella station, the station of issue, at the close of the official year, and whenever the fakir leaves the párá for another párá or for good.

3. The fakir shall at once report to the nearest forest officer any forest offence that comes to his notice.

4. For breach of condition 3 this permit shall be suspended for three months: for conniving at any forest offence the fakir may be debarred from again establishing a párá in the Government Forests.

Rules to regulate the grant of advances to Contractors and Disbursers.

1. No advance whatever should be made to contractors without the previous sanction in each case of the Divisional Officer, nor without some guarantee that the money so advanced is recoverable in cash, or by work done.

2. The Divisional Officer will be held personally responsible for all advances to contractors or disbursers, when the amounts can be shown to have been needlessly large or frequent, unnecessary or imprudent, or when the disburser can successfully plead ignorance of all written rules regulating his conduct as a disburser.

Conservator's Circular No. 111A, dated the 20th October 1892.

3. All applications from a disburser, for an advance for current expenses, must be accompanied by—

(*i*) a receipted voucher in Forest Department Form No. 27 ;
(*ii*) a detailed statement of the anticipated expenditure for which the application for an advance has been made.

In the detailed statement aforesaid only items of ordinary monthly expenditure, such as the pay of the establishment, cost of oil for lighting the revenue station at night, cost of jute, paint, and tar for executing petty repairs to station boats, &c., should be entered.

The grant of the advance, by the Divisional Officer, of the funds required to meet such ordinary expenditure shall be regarded as a sanction for disbursement.

4. The previous written sanction of the Divisional Officer is necessary for all extraordinary expenditure, such as the construction and repair of the buildings, bunds, jetties and coal platforms, &c., at revenue stations, or at head-quarters. On the completion of such work the officer in charge of the revenue station, or head office, as the case may be, shall submit a completion report. Final payment for work of the kind specified in this rule may not be made until the work has been inspected and passed by a gazetted officer of the Division.

Grant of leave to subordinates.

1. The Divisional Officer is empowered to grant sick leave (not exceeding three months) under the terms of articles 903 and 904 of the Civil Service Regulations to all non-gazetted officers serving under him, provided that no such leave shall involve the necessity of transferring a subordinate from another Division to officiate for the absentee.

Bengal Government, Revenue and Agriculture Department, Forests, No. 424 For., dated the 23rd July 1891.
Conservator's Circular No. 62E, dated the 28th July 1891.

2. A statement in Forest Department Form No. 68 shall be submitted with the monthly accounts, showing the extent to which such leave has been granted during the month. If no such leave has been granted during the month it will be sufficient to note in the usual way that Form No. 68 is blank.

3. No ungazetted officer of the Division shall be permitted to proceed on leave, other than sick leave, between the months of October and June, both months inclusive; and the Divisional Officer is forbidden to forward any such applications to the Conservator for his sanction. Moreover, no applications for leave, other than sick leave, can be entertained that would involve the absence of the ungazetted officer in question later than the 1st October.

Conservator's Circular No. 65E, dated the 31st July 1891.

Rules for the custody and control of the Steam-launches attached to the Sunderban Forest Division.

DUTIES OF THE OFFICER IN CHARGE.

1. With the previous sanction of the Conservator of Forests each launch shall be docked once in six months, or more frequently, if the Kidderpore Dockyard authorities consider such docking to be necessary for the examination or repair of the hull.

Bengal Public Works Department, Memo. No. 2214 Marine, dated the 18th December 1888, forwarded with Bengal Government, Revenue and Agriculture Department, Forests, No. 44 For., dated the 4th January 1889.

2. Once a month the boilers of the launches shall be examined by the Kidderpore Dockyard authorities, and the repairs then found to be necessary shall be executed.

Bengal Government, Revenue Department, Forests, No. $\frac{2917}{491}$ For., dated the 16th August 1890.

3. Such repairs as the following shall be executed by the crew under the orders of the officer in charge, namely,—

(i) repairs to awnings and curtains ;
(ii) repairs to stores and equipment ;
(iii) removal of rust and scale from iron-work ;
(iv) removal of paint on bare parts of the hull, especially along the water-line ;
(v) painting of the stationary parts of the machinery ;
(vi) making good small defects in the machinery, such as the loosening of joints, leaks in pipes, &c.

Bengal Government, Public Works Department, Irrigation, No. 744, dated the 12th January 1886, to Conservator.

4. The launch may not be taken from Samokpotha to Kidderpore *viâ* Tolly's Nala, but must proceed *viâ* Dhapa and the Chitpore Lock.

Conservator's No. 263 Camp, dated the 26th January 1886.

5. The launch may not be taken under the floating bridge across the Hooghly river at Howrah, except during slack water or against the tide; nor may it be taken under the said bridge after nightfall.

6. The officer to whom a launch is entrusted shall be responsible for its safe custody, and for its being maintained by the crew in a thoroughly clean and serviceable condition.

7. The establishment of a launch shall be appointed, subject to the sanction of the Conservator of Forests, under the rules of the Forest Department Code, by the Divisional Forest Officer, who shall be responsible for the fitness of each member of the crew.

Duties of the Engineer.

8. The Engineer in charge of the machinery must hold the following certificates under the Inland Steam Vessels Act VI of 1884, namely—

(i) A first-class Driver's certificate.
(ii) A second-class Master's certificate.

9. The Engineer shall be responsible that the brass and iron-work of the engine-room is kept clean and in good order, and that the machinery is maintained in a serviceable condition.

10. The supply of fuel in the bunkers shall not be allowed to fall below the quantity required for one day's consumption.

11. The fuel for the furnace shall be used alternately from the port and starboard bunkers in order to prevent the steamer from listing.

12. Stoking should be frequent, the fuel being added in small quantities sufficient to keep the fire-bars properly covered. The ashes should be removed from the furnace by frequent hooking with the fire-irons between the bars to prevent the ashes fusing and forming clinkers on the bars. The ashpit should not be allowed to become choked with ashes.

13. The draught to the furnace should be regulated by the damper, ashpit, or furnace doors. The smoke-box doors should not be opened except to clean flues or tubes. Tubes, fire-box, smoke-box, and the space at the back of the forebridge should be kept free from soot, and cleaned as opportunity offers, always after drawing fires.

14. Every frictional part of the engine should be kept well and regularly oiled. This should be done carefully, without undue waste of oil, through the oil-cups or holes provided for the purpose and with suitable oil-feeders.

15. The packing of the stern glands on the screw shaft must be attended to in order to keep the bilges of the launch dry. If the packing on examination be found hard and decayed, it should be renewed.

16. When getting up steam, and also when under way, the Engineer shall occasionally lift the safety-valve to see that it has not become set.

17. When the engines are no longer required, they shall be roughly wiped clean and dry before they become cold.

18. When the launch is not in use for some days, all polished parts of the engine should be coated with a mixture of white-lead and tallow, the frictional parts occasionally oiled, and the engines turned daily. The boiler should be opened and kept dry, and all cocks and valves moved at least once a week.

19. A log shall be kept by the Engineer showing how the steamer is employed from day to day, the number of miles run with or against the tide, the quantity of fuel consumed, &c.

Duties of the Serang.

20. The serang in charge of the vessel must hold a certificate of service under the Inland Steam Vessels Act VI of 1884.

21. The serang shall be responsible for the careful observance on the part of the crew of all routine orders. He shall see that every part of the vessel is kept clean; that the deck and hold are kept free from useless lumber; and that the ropes and poles are neatly arranged on the roof or paddle-boxes.

22. The decks shall be washed down daily with cocoanut husk and sand, and once a week with holystone and sand; iron gratings and brass-work polished; unpainted wood-work scrubbed; painted or varnished wood-work cleaned daily with a damp cloth, and once a fortnight with soap and water; and the capstan, rudder-spindle, and steering gear always kept well oiled.

23. Once in two months all stores and spare gear shall be removed from the holds and lockers in order to admit of the thorough cleansing of the interior of the vessel.

24. Bilges shall be cleaned out and dried once a week.

25. Awnings and curtains shall be kept properly and tightly spread when in use. If not in use, they shall be opened out occasionally and dried; and never put away unless perfectly dry. During the rains they should be dried as often as possible, and occasionally scrubbed and wetted with salt water to prevent the growth of mildew.

26. If the launch have a canvas roof, the roof shall be washed down regularly, and should be provided with a new coat of paint each year just before the rainy season commences.

27. The serang, or one of the secánis, shall always remain at the wheel when the launch is in motion.

28. Naked lights are prohibited below deck.

29. Night watches shall be set at 8 P.M., and shall be kept by the secánis and lascars in rotation, in spells of two hours, up to 6 A.M.

30. Once a week the port chain cable shall be hauled on deck, the kinks taken out, and the cable carefully relaid in the locker.

31. Once a fortnight the launch, if a paddle-wheel vessel, shall be given a day's rest in order that the Engineer may clean out the boiler.

32. When boats are sighted the launch shall be at once steered towards them, and the jolly boat manned without delay, in order that each boat, its cargo, permit, or certificate, may be examined by the officer in charge of the launch.

33. The engines should never be started suddenly, as such a proceeding throws an undue strain on the machinery.

34. When leaving landing places, moorings, or anchorage, the engines shall be moved slowly until the launch gathers way.

35. When approaching landing places or boats, &c., where a halt is intended, the engines shall be eased or stopped gradually; and the necessity for reversing the engines suddenly shall be carefully avoided.

36. If in navigating broad and exposed reaches of a river the roughness of the water causes the launch to pitch, and the engines to race or work irregularly, the speed should be reduced, and only sufficient way be kept to allow the vessel to obey the helm.

37. If a launch run aground while running with the tide, an anchor should be laid astern at once in order to get the vessel end-on to the current as soon as possible. If this precaution be not taken the launch may swing athwart the stream, heel over, and fill.

38. If a launch run aground while running against the tide, and she cannot be got off by simply reversing the engines and backing into deep water, an anchor and line should be laid out in the direction of deep water, and hauled or hove upon to assist the engines.

39. When a launch is at anchor or at moorings at night, a white light shall be kept burning brightly at the bow from sunset until dawn.

40. Running at night should be avoided as much as possible.

If the launch be run after dark the regulation lights shall be shown, namely, a *white* light at the bow, a *green* light on the starboard or right side, and a *red* light on the port or left side of the vessel.

41. If the launch remain at anchor for more than 5 days, the anchor shall be weighed and re-cast after each period of 4 days ordinarily, but during the freshets this should be done once in every 24 hours.

42. The following signals shall be made by steam-whistle, namely—

(*i*) a long blast of about 10 seconds duration when the launch is approaching sharp bends in a river or canal, or at any time to call the attention of another vessel;

(*ii*) two long blasts, each of about 10 seconds duration, at intervals to recall an absentee to the vessel;

(*iii*) prolonged blasts at suitable intervals on occasions when the launch is running through fog, dense mist, or rain, and it is difficult to see ahead; the launch being always run on such occasions at half-speed;

(*iv*) one short blast of about three seconds duration to denote:—"I am directing my course to starboard, and intend to pass port side to port side;"

(*v*) two short blasts, each of about three seconds duration, to denote:—"I am directing my course to port, and intend to pass starboard side to starboard side." This course may not on any occasion be adopted, except to avoid immediate danger of collision.

Indents for Stores.

43. A proportion-sheet of one month's stores, deck and engine-room, will be supplied to the officer in charge of the launch by the Deputy Director, Indian Marine, Kidderpore.

44. The quarterly indents for deck and engine-room stores shall be submitted in triplicate to the Divisional Forest Officer for transmission to the Deputy Director, Indian Marine, Kidderpore, one month in advance of the quarter for which the stores are required.

45. If it be found urgently necessary on any occasion to purchase such stores in the open market, the officer in charge of the launch shall at once report to the Divisional Forest Officer how the necessity arose.

R. D'R. & others—Reg. No. 4717J—128—19-7-93.